



FRIDAY, JUNE 2, 1876.

MASTER MECHANICS' ASSOCIATION.

Report on Boilers and Fire-Boxes.

[Concluded from page 229.]

Your committee would submit, as a part of their report, the following from Mr. S. J. Hayes, one of the members of the committee, as expressing his views on the different subjects alluded to, in which all the other members fully concur, and endorse:

"CHICAGO, May 1, 1876.

"B. WELLS, Esq.,

Chairman of Committee:

"DEAR SIR—Of the three materials used for furnace sheets of locomotives, copper, iron and steel, I prefer steel; but plainly see the necessity of urging the manufacturers to make it soft, ductile and homogeneous, because the higher the grade of steel the greater its liability to crack after being put in service. I take it for granted that all members of our Association are aware that each of the three materials named is objected to by different master mechanics for the following reasons: Copper, because it is too expensive; iron, because it is liable to blister or crack; steel, because it is liable to crack.

"These are the main points which, in my opinion, should be borne in mind in dealing with these materials for furnace sheets. So much has been said and written on the subject of copper and steel furnace sheets in past years that I do not think our committee should occupy the time of the Association by again repeating it, but should endeavor to present a few new facts in relation to steel furnace plates. What we all want to know is the effect of fire and water on steel plates. About one year ago I conducted the following experiments, which will perhaps be of interest in this connection:

"A piece of 'open hearth' steel plate, 5-16 in. thick and 9 1/2 in. square, was heated to a cherry-red heat, and dipped in cold water six successive times, after which the edges were found slightly rounded; that is, the sheet measured exactly 9 1/2 in. across the centre, but a very little less across the edges, showing that the contraction in this case was along the edges of the sheet. After being heated and cooled, as described, the steel was quite soft and was bent double cold, without fracture. Two tests of its tensile strength were made with the following result:

"No. 1 stretched 3/4 in. and broke at 80,914 lbs. per square inch.

"No. 2 stretched 3/4 in. and broke at 74,057 lbs. per square inch.

"The average being 77,485 1/2 lbs. per square inch.

"To see if the heating and cooling for six successive times had affected the strength of the plate, two samples cut from the same part of the same sheet as the 9 1/2 in. piece were tested; these samples were not heated and cooled, but were taken from the sheet just as it came from the mill.

The following was the result:

"No. 1 stretched 3/4 in. and broke at 57,200 lbs. per square inch.

"No. 2 stretched 7-16 in. and broke at 64,475 lbs. per square inch.

"The average being 65,837 1/2 lbs. per square inch, the tensile strength of the steel having increased 17.7 per cent. by the heating and cooling described. It seems probable that the increase in tensile strength was accompanied by increased hardness, but yet the steel bent double, cold, after being heated and cooled six times. In the year 1871 the committee of which I was chairman gave the average tensile strength of three pieces of 5-16 steel plate as 71,165 lbs. per square inch of section.

"The steel tested was what is known as 'crucible steel.' The 'open-hearth' steel seems to be softer and more ductile, but of less tensile strength than the crucible steel which was tested and reported to this Association five years ago. The tests were made at the shops of the Illinois Central Railroad under my supervision.

"Careful observation has, to my mind, demonstrated that the nature of the water used in locomotive boilers has a great deal to do with the life of steel furnace sheets. The liability to crack increases with the impurity of the water used in the boiler. Roads troubled with heavy formations of scale in boilers have also greater trouble from the cracking of steel furnace sheets than have those roads along whose line the water is comparatively pure, and whose boilers are free from scale. I presume you have considerable information on this particular point, and may deem it necessary to give it in detail. I therefore state the following facts, which strongly support the conclusion stated. The Illinois Central Railroad is about 1,100 miles long, about 700 miles being in the State of Illinois and 400 miles in the State of Iowa. On this line the greatest deposits of scale are formed in boilers of locomotives employed on the Northern Division, which is 235 miles long. I have lately tested the water from two water stations on this Division, with the following results:

"Mendota station, 84 grains of solid matter per gallon of water.

"Batland Station, 70 grains of solid matter per gallon of water.

"Number of engines on the Division, 49.

"During two years ending March 31, 1875, six crucible steel sheets and one Low Moor iron side sheet have cracked on this Division. On the Chicago Division of the same road, water was tested from five stations with the following result:

"Chicago, 18 grains solid matter per gallon of water.

"Kankakee, 20 grains solid matter per gallon of water.

"Giles, 15 grains solid matter per gallon of water.

"Champaign north tank, 20 grains solid matter per gallon of water.

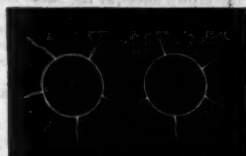
"Champaign south tank, 34 grains solid matter per gallon of water.

"Number of engines on the Division, 69.

"During two years ending March 31, 1876, three crucible steel sheets have cracked on this Division. I invite your careful consideration to the foregoing facts, which point directly to impure feed water as one of the prime causes of failure in steel furnace sheets. Frequent washing out with a good force of water and prompt removal of incrustations are the remedies. The use of surface or other pure water is the only sure preventive, and the day will come when railway managers will see that 'prevention is better than cure.'

"A freight locomotive with 16x24 inch cylinders will use about 6,000 gallons of water per day, or 1,800,000 gallons per year of 300 working days; and assuming that such an engine used for 300 days the water from Mendota station, we find that 21,500 lbs. of solid matter would be precipitated in the time specified. Of course the greatest portion of this would be removed by the frequent washing out of the boiler customary upon all roads, but there would remain on the flues and furnace sheets large quantities of incrustation, detrimental to those parts of the boiler, and to its steaming capacity. On roads where boiler incrustations are heavy, it is common to

see a number of small cracks in steel furnace sheets, radiating from the stay bolts, as shown in these sketches.



"For lack of a better name, we call these 'mud cracks,' and find them from 1/2 in. to 1 1/2 in. long; sometimes they leak a little, but on being drilled, tapped and plugged with several small copper plugs, will run for several years. Others, and in fact nearly all these small 'mud cracks,' do not leak at all. It is probable that the accumulation of scale around the stay-bolts is the immediate cause of these small checks or cracks. The scale on one side of the sheet and the fire on the other produce the result described. Allowing for the cracking of steel furnace sheets and expense of patching or replacing them, I must say that I am still of the opinion that steel is the best material to use for this purpose, but I again say that manufacturers must devote their attention to making steel of low grades—soft, ductile and homogeneous.

"For the outside shells of locomotive boilers I think steel plate should be used.

"In regard to the form and proportion of boilers, we have nothing new to offer. The ground has been canvassed yearly for the last seven years, during which time straight and wagon-top boilers have been discussed, so also have water tables and fire-brick arches, and a few other appliances. The facts and figures in relation to all these have been placed before the Association and now form a part of its records. I do urge, however, the importance of large furnaces for coal-burning engines; the use of flues not less than 11 ft. in length; the admission of air above the fire through hollow stay-bolts, or tubes provided for that purpose; the use of 1/2 in. steel or 5-16 inch iron for sides, back and crown of furnace, and 3-8 in. steel or 7-16 in. iron for back flue sheets. The use of small smoke-boxes will also be found advantageous. I would recommend that all steel sheets should be annealed after being flanged, and I think all holes in steel plates should be drilled.

"Yours truly,

"S. J. HAYES,

"Superintendent of Machinery Illinois Central Railroad."

RENEWAL OF FIRE-BOXES.

From the reports of 1,277 coal-burning engines having steel fire-boxes, we find that but 15 are reported to have had their fire-boxes renewed on account of the old ones becoming unserviceable from small cracks at stay-bolts, rivets, and from general deterioration.

These fire-boxes had been in use from four to seven years and had made the following mileage: one made 95,000 miles; one, 118,000; five averaged 125,000 miles each; four averaged 140,000 miles; one made 154,000 miles; two averaged 188,500 miles; and one's mileage was not given. The average for the 14 given is 137,700 miles each.

The highest mileage given of a steel fire-box which is still in good condition is on the Old Colony Railroad, in a passenger engine which has made 245,000 miles. The North Pennsylvania Railroad reports a mileage of 250,000 in passenger engines and 123,000 in freight, and the fire-boxes still in like good condition. The Central Railroad of New Jersey reports steel fire-boxes on that road as having made a mileage in passenger engines of 235,000, and in freight engines 112,000 miles, which are still in good condition and free from cracks.

The Terre Haute & Indianapolis road reports a mileage of 184,000 in passenger and 208,000 in freight engines, and the Jeffersonville, Madison & Indianapolis 200,000 miles in passenger and 150,000 in freight engines, the fire-box sheets of which are still free from cracks and in good condition.

The Lake Shore and Michigan Southern Railway gives a mileage of 136,000 in passenger and 163,000 miles for freight engines in which the steel fire-boxes are yet in good condition. Other roads reporting the mileage of their steel fire-boxes which are still in good order, give it from 100,000 to 180,000 miles. From the experience had with steel fire-boxes on the roads making reports to us, the conclusion is reached by them that on roads where good and comparatively pure water is used, such as the North Pennsylvania and Old Colony railroads, 300,000 miles may be considered the average lifetime of a fire-box before renewal is necessary. A number of other roads, that report the quality of water used as medium, state that on their lines 250,000 miles may be considered a good average mileage for the lifetime of a fire-box; and those roads that report using water that contains large quantities of lime and other impurities, as the Lake Shore & Michigan Southern and the Kansas Pacific, state that on the latter 150,000 miles in passenger and 120,000 in freight engines is about the average lifetime, and on the former road, 200,000 miles is a good average for a steel fire-box.

The data in regard to iron fire-boxes in which coal is burned are so incomplete that we cannot give figures or information sufficient to warrant any comparisons with steel. Mr. Charles Graham, of the Bloomsburg Division of the Delaware, Lackawanna & Western Railroad, states that he has iron fire-boxes with corrugated side sheets in the anthracite coal-burning engines on that road, which have made a mileage of 183,000 miles, and which are to all appearances still perfect.

Corrugated steel sheets for fire-boxes are now being largely used on the Chicago & Northwestern Railway, and it is stated, with good success. We are sorry to say, however, that we have no report from the officers of that company in regard to its merits. Mr. James Sedgley, of the Lake Shore & Michigan Southern Railway, reports that he has 20 fire-boxes with corrugated steel sheets, all of which are doing well. The greatest mileage made by any of these is 27,000. Corrugated steel is being used for the side sheets on several other roads to a limited extent, but the test has not yet been sufficient to determine the value as compared with plain sheets. We have been unable to get sufficient data in regard to the experience had with copper used for fire-box sheets, to enable us to make any comparison with that of iron and steel.

THE BEST FORM AND PROPORTIONS.

In our investigations of the above subject, your committee directed their inquiries with the view of ascertaining what changes in the form and proportion of the ordinary boiler and fire-box in use were requisite in order to obtain better and more economical results in the consumption of coal.

In the replies received, no material change in the form of the boiler or fire-box is recommended from that in general use. For anthracite coal the long and comparatively shallow fire-box is considered the most economical, and for the use of bituminous coal a large and deep fire-box is almost universally conceded to be the best. Those who have had considerable experience in the use of what is known as the Weston boiler, state that this form of boiler has not proved to be more economical in the use of coal than the ordinary plain fire-box. The same statement is also made in regard to that form known as the Jaquet fire-box. In designing the form of a fire-box, it should be borne in mind that a large portion of the heat received by the heating surfaces is radiant. That is, it is not carried to the sheets by currents of heated gases, but is received as rays, the same as light, and these heat rays will not bend around a corner any more than the rays of light. Now if a water table or brick arch is placed in the fire-box, these heat rays that come from the fuel in combustion on the grate will be cut off from the upper forward portion of the fire-box, those parts

being in the shade, as it were, as regards the rays that emanate from the vicinity of the grate. In the case of the water table, its lower surface would receive these rays, cut off from the upper part; and the brick arch would reflect them to the sheets back of it. Yet, on the whole, nothing is gained by the use of either arrangement, so far as the radiant heat from the combustion going on in the lower part of the fire-box is concerned. To that principle, then, we may attribute the fact that an increase of heating surface is not always followed by a corresponding increase in beneficial results. The opinion expressed, however, is almost unanimous that a larger fire-box would result in increased economy in the consumption of fuel.

Some recommend that the fire-box be lengthened as much as the spread of the driving-wheels will admit of, even at the expense of shortening the tubes to that extent, where bituminous coal is used as fuel. Your committee do not consider that mere opinions on such points are of much value unless based upon the results of careful experiments, and no data of this sort have been furnished us; therefore we can form no conclusion as to the exact number of feet of fire-box heating surface and tube surface best adapted to furnish steam economically for a given size of cylinder in a given time. This matter is one of as much or more importance than any other in furnishing power; and at the same time our positive knowledge as to the best proportions, area of fire-box, length, size and number of tubes that can be arranged and adapted to the present style of locomotives in use in this country, is less than upon any other subject connected with the use and management of the locomotive. Are the proportions as now generally adopted for boilers intended to burn bituminous coal the best possible? If not, what should they be? Should the fire-box be longer, or shorter and wider, and how much? Where is the limit? Would it be economical to lengthen the fire-box at the expense of shortening the tubes? If so, to what extent? Is a three-inch water-space on the side of a fire-box more economical in the use of fuel than a 3 1/2 in. space? Should the side sheets of the fire-box be curved outwards above the frame, or should they be perfectly straight and vertical, or should they incline toward the centre at the top proportionally, reducing the area of the crown sheet? These are questions that naturally suggest themselves, but we have been unable to obtain any information on these points based upon actual tests, and until they are made in a careful and thorough manner with the view of obtaining all the facts relating to the points referred to, changes from the forms and proportions now in use that would result in economy cannot with certainty be pointed out. In view of this importance, we would recommend that special attention be given to these matters during the next year.

Some observations made by your committee on the effect produced by inclining the side sheet of a fire-box, as regards the course of the steam globules as they pass upward in the water-space, may not be without interest to some of our members.

The water-space with glass ends, referred to previously in this report, was used for the purpose. As before stated, this water-space formed one side of a square iron box, with the top of the grate one inch above the bottom. With clear water the view through the water-space and the plate-glass ends was perfect, and the formation of the steam globules on the side of the sheet of iron next the fire, and their course upward through the water, could be seen with great perfection. Before the thermometer indicated 120 degrees at the top, infinitely small white globules formed and passed upward close to the surface of the sheet in unbroken streams, yet no movement of the surface of the water could be detected, nor vapor seen. As the heat increased and the water boiled, the size of the steam globules increased also, and in their ascent they extended farther out into the column of water, and the greater the heat and violence of ebullition, the farther these steam globules seemed to be repelled from the sheet where they were formed, and the more thoroughly they mingled with the whole body of water in the space. The motion of these steam globules seemed to be, to a considerable extent, independent of the motion of the water through which they ascended, as could easily be determined by introducing particles of wood into the boiling water. The principle agitation of the water was at the top, mostly in the first two inches in depth, that below remaining comparatively quiet, so far as currents were concerned, notwithstanding the clouds of steam globules that rolled upward through it, often in graceful curves, the same as if floating through air.

As stated above, when ebullition was the most violent the steam globules were largest, some of them as large as 1/4 inch in diameter, seeming to come out from where immense numbers of smaller ones were passing upwards, and to have been formed from a number of smaller ones, as a large drop of water results from the union of smaller ones. The large round globules would sometimes strike the outside sheet and rebound, or roll along the sheet upward, then bounding from it back through the water as if highly elastic, as if passing through air, and disappearing at or near the surface. The large globules referred to were not seen to form at any point except where the temperature of the sheet was probably the greatest, about the height of the top of the coal on the grate or a little above that. When the water boiled slowly, the best opportunity was offered for observation.

At such times the steam globules ascended in a great stream near the sheet, when perpendicular, gradually diverging from it as they neared the top, until at that point they filled the entire water-space. When the water-space was inclined toward the fire, the globules took a vertical direction and diverged from the sheet more rapidly, and when the incline was outward, or from the fire, the tendency of the globules was to pass up in close proximity to the sheet until near the top, when in all cases they diverged so as to fill the whole space. When ebullition had nearly ceased, or was just beginning, it was always observed that wherever there was a spot on the surface of the sheet that was perfectly clean and clear of the usual hard scale of sheet iron, the clean, raw iron being in contact with the water, that at every such spot small steam globules were thrown off in continuous streams, like the leakage of steam through a porous substance, while at all other parts of the surface where the sheet had the usual smooth, hard iron surface, scarcely any globules would be formed, showing that much more heat passes through into the water at points where the clean, raw metal and water are in contact, than where the conditions are otherwise. The action of water under a steam pressure when steam is being drawn from the boiler as fast as it will generate it cannot be materially different, so far as the formation and movement of steam globules are concerned, from that taking place under pressure of the atmosphere only.

In either case, all passes off that heat will generate under the different conditions. We are led to believe from a close observation of the formations of steam globules at spots where the water comes in direct contact with the metal, and that of others where the contact is less perfect, that if the surfaces could be kept perfectly clean a very marked saving of fuel would result, as well as economy in boiler affairs.

We append as a part of our report a sketch, Fig. 4, of the form of fire-box adopted by Mr. J. Johann, Master Mechanic of the Toledo, Wabash & Western Railway and as used by Mr. Boon on the Western Division of the Pittsburgh, Fort Wayne & Chicago Railway. The crown sheet slopes backward from tube sheet, at the rate of about one-inch per foot, and it has also the form of an arch with a slope of three-inches from the center towards the sides. Mr. Johann states that this form, to a great extent, prevents the permanent lodgement there of scale and dirt.

ADMISSION OF AIR TO THE FIRE-BOX.

To the question in admission of air to the fire-box through

hollow stays or tubes, the replies received show that this is being done almost universally where bituminous coal is used. Such hollow stays or tubes entering the fire-box at points from twelve to eighteen inches above the grate, and their aggregate area, in most cases, compared with the area of the stock, is as 1 to 45. In one case, that of the St. Louis, Vandalia, Terre Haute & Indianapolis, Mr. Peddle states that his practice is to make them as 1 to 18, and finds the result to be satisfactory in a better consumption of the gases, and consequently less smoke from the stack. Another member of your committee is using such tubes mostly in the back sheet, and 12 inches above the grate, of the proportion of 1 to 25, with equally satisfactory results. We are not prepared to say that such admission of air results in any marked saving of fuel, but the result appears to be a better consumption of the gases that otherwise are an annoyance in the form of smoke. The kind and quality of coal used will determine the quantity of air that should be admitted above the grates in order to produce the best results, and it is quite probable that difference in coals will require a corresponding difference in the quantity of air requisite to produce the best results in their consumption, in producing heat, and so far as possible avoiding smoke. The question is sometimes asked whether it is not probable that a boiler may be made too large to furnish a given quantity of steam in a given time, with the greatest economy of fuel, on account of the heat lost by radiation from the exposed surfaces of a boiler of unusually large proportions. In answer to this question, we can only state what the total loss of heat is from a boiler of a given size and proportion, under certain circumstances. A test was made by one of your committee in March, 1875, to ascertain the loss of heat by radiation from a locomotive when at rest. A freight engine which stood on a side track near the round house was selected. The boiler was 51 inches in diameter at the smoke-box, and of the wagon-top pattern, with one dome. The heating surface in the fire-box above the grate was 97½ square ft., and of the tubes 826 ft. (internal surface), and the boiler contained 8,500 pounds of water at three gauges. There was, however, about two inches more than the three gauges of water when the test began. There was no perceptible leakage at the throttle, safety valve, or anywhere about the boilers, which in all its parts was perfectly tight, and was covered with a Russia iron jacket in the usual way. When the test began there was a very light fire in the grate, and the steam pressure was 80 lbs. Steam was maintained at that pressure for 12 hours, during which time the dampers remained closed, and the engine was not moved. No steam was drawn from the boiler, nor was there any additional water put in it, and there was still three gauges at the close of the test. The average temperature of the atmosphere was 50 degrees with but very little wind. At the expiration of the 12 hours the steam pressure, and the fire on the grate, as near as could be determined, were equal to that at the beginning, and the consumption of coal was found to have been 300 lbs., or at the rate of 25 lbs. per hour. This may be considered a very fair test as to the quantity of coal required to furnish heat to replace that lost by radiation, under the circumstances named. In running, particularly when there are high winds, the loss of heat would probably be much greater, even at the temperature given.

Your committee received the following article "On the Best Manner of Flanging, Annealing and Working Steel Plates in the Construction of Boilers," from Mr. Wm. Fuller, General Master Mechanic Atlantic & Great Western Railroad, which, though not strictly speaking one of the subjects assigned us for investigation, yet is closely connected therewith. Deeming this paper on that subject one of considerable importance, we present it herewith, and embody it as part of this report:

"To R. WELLS, Esq.,
Chairman of Committee on Boilers and Boiler Material,

"DEAR SIR: In addition to answering the questions of your circular, I beg to submit the following on the subject of boiler making, as invited by you:

"**Flanging.**—In flanging steel, great care should be taken in the heating of the plates, as there is no doubt more steel destroyed by overheating than by all other causes combined; and, as is well known, it is almost impossible to trace to the workmen the defect of overheating, as of course they will not admit that the defective part is because of their own carelessness. In heating steel for flanging the orifice of the blast pipe should at all times be covered to the depth of not less than nine inches with good, clean coke and not be allowed to burn out hollow under the plate to be flanged, as the blast will strike the plates in large currents, and have a very damaging effect on the steel.

"The flanging forge should be long and narrow, as it is very important to have a long heat, so that the plate can be flanged in long sections, as the flanging of short sections is the principal cause of the buckling or warping of the plate, consequently requiring far more use of the sledge, which is steel plate's worst enemy. In turning the flanges, it should be worked at nearly the same angle the whole length of the heat, and under no circumstances should the workmen attempt to straighten the plate after the color of the heat has left it. The next step is to level or straighten the plate. This operation is of vital importance in several respects. The plates should be placed in a furnace constructed for that purpose. The furnace should have a strong draft (which can be regulated by the aid of dampers). The fuel used must be well-seasoned bark, charcoal or soft wood. The heating of the plate should not be forced, because if the plate is allowed to heat gradually it will be more uniform, and the process of annealing in the bed prepared should continue with the same uniformity. The operation of flanging the plates should be done with large, heavy, flat-faced mauls. If the plate is thick and stubborn, large-faced flatters might be used with care, but under no circumstances allow the plate to be struck with the sledge, as it is known the face of all sledges is convex or rounded, and the whole force of the blow is concentrated in a very small point, and is of the nature of a bruise. The plate, when leveled and while yet hot, should be placed upon a bed of fine charcoal from four to six inches deep, and covered with the same material from four to six inches deep, and allowed to remain in that position from 12 to 15 hours, according to the thickness, when it will be sufficiently cool to handle with ease. The next operation is the rivet holes in the flanges, which should in all cases be drilled. If the flange is punched, it will be noticed in a few months that cracks will make their appearance from the rivet holes to the edge of the flange, and as the flanges of the fire-box are generally exposed to the fire, it will be seen that all of the original strength of the steel is required to combat the action of the heat. The rivet holes in the side sheets of fire-boxes might be punched, as the edges of the side plates are not exposed to the fire.

"**Fitting.**—Care should be taken in the operation of fitting the plates that the holes are perfectly true. If the holes should overlap, they should be reamed straight and longer rivets put in. The plates should be fitted so that they will lie up close to the flanges without the aid of bolts. Boiler makers as a rule place too much dependence upon the use of bolts for drawing and straining or forcing the work together, instead of using their judgment, skill and common sense in fitting the work.

"**Riveting.**—The next step that claims attention is riveting. Upon that operation depends, to a great extent, the safety and durability of the boiler. If the work has been properly fitted, it does not require much skill on the part of the riveter to make strong and light work, but if the plates have not been shaped and fitted in a proper manner, then the riveter, if not a skillful workman, generally completes the operation of producing a defective boiler. In riveting fire-boxes the side sheets should be riveted to the flanges of the crown sheet first. The

seams down the tube sheet and door sheet should both be riveted down from the crown sheet at the same time. Lay five or six rivets on each side alternately. By this mode it will be seen that the working or buckling of the plate is prevented, and whatever strain is produced by the hammering on the rivets and sheets will be carried down equally on each side and worked out at the bottom of the fire-box.

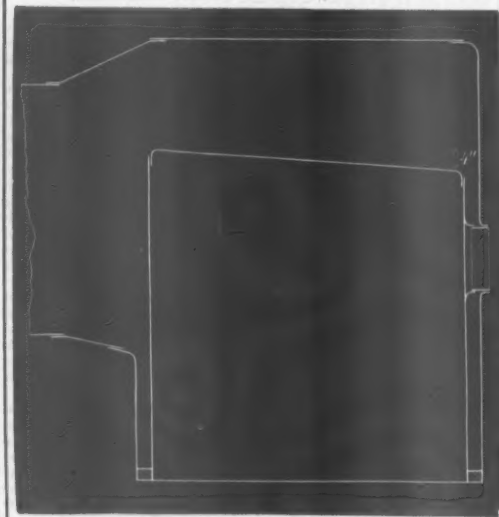
"The use of drift pins for the purpose of enlarging the holes is objectionable and should not be tolerated.

"**Calking.**—Defective calking has much to answer for and should come in for a large share of close inspection, as it is not easily detected after being finished. If the plates have been well fitted and riveted, the calking should be light. The plate, if clipped to an angle of about 45 degrees, will not be required to be calked up only about one-third of the thickness. Heavy calking has a tendency to spring and wedge the lap apart, and also to groove the under plate. It also breaks the surface or skin of the plate, and leaves it in the best condition for corrosion to commence its work at once. The calking tool should not be allowed to touch the inside of the boiler, as corrosion will cut its own channels fast enough without the aid of the calking tool.

"**Stay Bolts.**—The matter of stay bolts should be watched with



care, as upon the proper distribution and fastening of them depends a large share of the safety of the boiler. The holes must be exactly opposite each other, the threads on the stay bolts should be cut up full and smooth; threads in the hole, full. The taps should be sharp, so as not to tear out the thread, but to cut it. The stay bolts should be screwed into the boiler with a wrench not over twelve inches long, so as to prevent tension if the bolt should be too large. Neither should the stay bolts be loose. A proper guide is to have the stay bolt fit in the outside plate, so that it will not shake in the hole



after it has been screwed into the plate three or four threads. The stay bolts should project outside of the plates a quarter of an inch, and should be cut off so as to leave a flat surface on the ends.

"In riveting stay bolts heavy hammers should never be used, because if the stay bolt is properly put in it does not require to be spread out in the centre, and that has a tendency to crack the plate from one bolt to the next. The bolts should be driven with the ordinary riveting hammer, and only hammered on the outer rim of the stay bolt.

"**Bracing.**—The bracing of a boiler in a proper manner is of the utmost importance, and should be done by the best men in the shop.

"The braces from the crown bars to the shell or roof of boiler should be of sufficient strength to sustain the whole pressure to which the crown sheet is subjected. They should be fitted accurately, so that when the pins are set in they will be tight and firm, but not strained or loaded. Braces that extend from the crown bars up to the shell or roof of the boiler should be made so as to admit of being fastened at each end of the brace with a pin or ball—as it will be seen that if one end of the brace is riveted fast to the boiler it is almost impossible to determine if the brace is properly set after the rivets have been driven in the upper end, in consequence of the rivets holding the brace firm. The pin that connects the brace with the crown-rod and crown bar must be of the same diameter the whole length of bearing on the pin, for, if the pin is taper, one side of the jaw will have to support all the load.

"**Tube Setting.**—The setting and repairing of tubes is probably the most expensive item charged to the repair account of the locomotive boiler. The setting or fastening of tubes in the tube-sheet appears to be in the same primitive condition it was twenty years since, and the probability is that the question will continue to be a source of expense and annoyance as long as the present system is followed, and unless some plan is perfected whereby a good joint can be easily made so as to prevent the end of the tube from being exposed to the intense heat that is generated in the fire-box.

"The present method of setting the tubes is to allow the end of the tube to project through the tube sheet about ¼ inch,

and then the torture of the tube is commenced by the use of the expanding tool—which is a very severe operation upon both the tube and the tube-sheet. The effect on the tube is to crush and swell it out so as to make a tight joint. The nature of the strain on the tube-sheet is to burst asunder the small part of metal that is left between the tube holes after the plate is bored. And after a short time it shows the nature of the treatment it has received in the operation of expanding by bulging and cracking between the tube holes. The question is often asked why it is that tubes become leaky and troublesome in so short a time after such an immense mechanical power has been brought to bear upon them. The answer is simple. The whole nature of the material of which the tube is composed has been changed by the enormous strain to which it has been subjected.

"**Expansion.**—In expanding the tube, all mechanics know that stretching and enlarging the tubes destroy the fibre of the iron—if iron is used. Next the tube is subjected to the operation of being hammered over the end with a round-faced hammer to form a kind of flange.

"**Smoothing.**—It is next treated with a calking or beading tool, constructed especially for the purpose of giving it a smooth and uniform appearance, or, in other words, to close up the fractures and cracks that have made their appearance in the operation of expanding and turning over the end of the tube, and it is then in the best possible condition for the fire to complete the total destruction of the end of the tube. Another damaging effect of the expander is the impossibility of its uniform use in expanding tubes on account of the variation of their thickness, which all mechanics connected with that branch of business are aware of. In conclusion I would add that one great obstacle to the general or successful use of steel in the construction of steam boilers is the lack of skillful and intelligent workmanship.

Respectfully yours,
"WM. FULLER,
General Master Mechanic, Atlantic & Great Western Railroad."

ENLARGED SMOKE-BOXES AND STRAIGHT OPEN STACKS.

To the inquiries made in regard to enlarging the smoke-boxes, raising the exhaust nozzles, and substituting the plain open stack for the usual diamond stack, we have received but few replies.

Mr. James K. Taylor, Master Mechanic of the Old Colony Railroad, states that the plain stack was used on that road several years ago, without any netting. The exhaust pipes were raised to the top of the smoke-box, and a sub-treasury or spark-box was attached to the bottom for the reception of the sparks; but that the arrangement was abandoned for the reason that it was not proof against the danger of fire along the road.

The fuel used was bituminous coal.

Mr. Wm. Woodcock, of the Central Railroad of New Jersey, states that in the anthracite coal-burning engines on that line, the plain open stack has been adopted in place of the diamond stack. The exhaust nozzles are on a line with the top row of tubes, or higher, and a cone of wire netting extends from them to the top of the smoke-box. This arrangement has worked very well.

Mr. F. M. Wilder, of the Buffalo Division of the Erie Railway, reports that the straight open stack gives better results, both as to economy in fuel and in the steaming quality of the engine, and that he has enlarged the opening in the top of the diamond stacks with very good results, with engines burning bituminous coal.

In several passenger engines of the Jeffersonville, Madison & Indianapolis Railroad Company running between Louisville and New Albany several years ago, the plain open stack was used, with a modification of what is known as the Smith's patent in smoke-box, consisting of a cone of perforated iron, extending from the exhaust nozzles to the base of the stack, surrounded by a case, or lifting pipe. This arrangement answered the purpose, so far as draft and steaming are concerned, but small particles of coal and cinders were thrown from the stack to such an extent as to be more or less of an annoyance to passengers in summer, when the car windows were open. After a year's trial, this arrangement was removed from the smoke-box, and the exhaust pipes raised on a line with the top row of tubes, and wire netting of 3½x3½ meshes per inch placed across the smoke-box above the tubes, and fitting around the exhaust nozzles; a spark-box was added to the bottom of the smoke-box with a self-closing valve in the bottom. This arrangement has been in use for the past two years with entire satisfaction. The engines steam more freely than before, and all annoyance from dust and cinders from the stack is avoided. The short runs of 6 miles each give opportunity for emptying the spark-box whenever necessary.

The arrangement referred to above as a modification of the Smith patent was used on a number of engines on the Main Line of this road, having smoke-boxes of the ordinary size and shape, some three years ago. This arrangement gave good results with the use of Pittsburgh or similar coal, but not with the quality known as Indiana block coal, except that in the case of both small round particles of coal and cinders were sometimes thrown from the stack in quantities to be an annoyance. This, however, was principally confined to the use of "block" coal. When Pittsburgh coal was used, the smoke-box was comparatively clean of sparks, coal or cinders; not much of either was thrown from the stack, the draft always being good, and the engines steamed freely; but when the block coal was used, the case was different in several respects. This coal is composed of thin layers of hard and soft coal, alternately, the soft being almost identical with charcoal and very light. These light particles were carried in large quantities to the smoke-box by the draft, and were drawn up between the perforated pipe and the "lifting pipe" around it, and closed the perforations by sticking fast in them to such an extent as to seriously affect the draft on the fire and the steaming of the engine. This was more particularly the case when the engines were worked up nearest their full capacity. As Pittsburgh coal was burned going north and block coal south, this arrangement of straight, open stack, did not work satisfactorily, on the whole, and the fact was demonstrated that an arrangement of smoke-stack that gave very good results when one kind of coal was used did not do so with the other.

After a year's trial, the diamond stack was substituted for the arrangement referred to, with better results in every respect, in burning the two kinds of coal on alternate trips.

The difference in the results obtained from the use of the same pattern of stack on different roads is therefore mainly due to the difference in the quality or character of the coal used. As an illustration of the difficulties to be overcome in burning the "block" coal referred to, or coals similar to it, when the straight, open stack is used, with an arrangement in the smoke-box for retaining the sparks, we give the result of some tests made a few days ago by Mr. Peddle, of the Terre Haute & Indianapolis Railroad, to determine what per cent. of the total weight of the coal put into the fire-box was carried through the tubes into the smoke-box, under the ordinary conditions of service, by engines having the plain fire-box, without a brick arch, water table or other deflector. Mr. Peddle used several passenger engines in use which have had their smoke-boxes extended about 30 inches, the lower part of the extension forming a reservoir extending down as far as the truck of the engine will permit, the bottom being closed by a valve. A plate of sheet iron, immediately above the tubes, extends from the tube-sheet to the exhaust pipes, horizontally, and fitting closely around the steam pipes, the nozzle of the exhaust pipes projecting a few inches above it. From the forward edge of this sheet-iron plate a wire netting extends horizontally about 30

inches, then vertically to the top of the smoke-box, so that no sparks or cinders could pass out through the stack except such as passed through the meshes of the netting.

The tests were made with two engines hauling passenger trains over the Indianapolis Division. Engine 24 had cylinders 16x24 in. and 5 feet drivers. No. 21 had 16x22 cylinders and 5 1/2 feet drivers. Their average weight with tender was 42 tons each, and the average number of cars hauled by each was 4 1/2, and the total weight of each engine and its train was 132 tons; distance run by each, 146 miles; speed, about 30 miles per hour when running. The exhaust was through a single nozzle 4 inches in diameter. The results in the case of these two engines were so nearly alike that we give the average of the two.

Coal used in running 292 miles, 11,580 lbs.; weight of sparks taken from the reservoir in smoke-box, 1,300 lbs., or nearly 11 1/2 per cent. of the total weight of the fuel put into the fire-box. It was found that a bushel of these sparks as taken out, struck measure, weighed 28 pounds. Three bushels of these sparks were burned on a small grate in a brick furnace in the course of three hours, by a light blast of air admitted under the grate, to ascertain what proportion of their weight was combustible material. They burned with a heat sufficient to melt the end of a wrought-iron poker in a very short time after putting it in, and after the furnace cooled down the weight of the ashes, cinders and debris was a fraction less than 12 per cent. of the whole, showing that 88 per cent. of the weight of the material carried through the tubes by the draft was combustible.

The cinders, ashes and other debris taken from the ash-pan of the engines after running the 292 miles were 928 pounds, or 8 per cent. of the weight of coal used. This, added to the weight of the sparks, = 19 1/2 per cent. of the coal used by the engines which, so far as generating steam was concerned, served no useful purpose.

With the comparatively light trains handled, and a 4-inch exhaust nozzle, it is not probable that the quantity of sparks carried to the smoke-box was any greater than usual. Mr. Peddle states it to be about an average, and that on several previous occasions, with trains one-third greater and fast runs, the weight of sparks taken out of the box was 50 per cent. greater for the same distance run.

From these tests we find that 11 1/2 per cent. of the weight of coal used in these engines goes through the tubes to the smoke-box, and that it is a little more than double the volume there, that it was when put into the fire-box, or about 25 per cent. of the total volume of coal used. These being the facts, it will be seen that in burning this or similar coal, we must provide store room for one shovelful of sparks for every four shovelfuls of coal put into the fire-box; or arrange the smoke stack so that it will be thrown out.

These two engines were supplied with another kind of coal, called "Ashland," from mines in the northeastern part of the State of Kentucky, and made a mileage of 438 miles with trains of the same weight and speed, as in the former trial, with results almost identical with that given. The engines steamed more freely with the Ashland than with block coal, but the proportion carried to the smoke-box was about the same.

We have had no opportunity to test the coking coals used in Ohio and Pennsylvania, but infer the proportion carried to the smoke-box from the use of those coals would be considerably less. But we have here the fact demonstrated, in the case of the coals being used by Mr. Peddle, that nearly 9 1/2 per cent. of the total combustible portion of the coal is wasted by being carried from the fire-box by the ordinary draft of the engine, working under the conditions given, without being burned; and there are doubtless considerable quantities of very fine particles of unburned coal carried through the netting out into the air, in addition to that retained in the smoke-box. From our observation we think it probable, on an average, that at least 10 per cent. of the fuel used by engines burning bituminous coal in this country is wasted in the way referred to above. Can this fuel be retained in the fire-box until consumed there, giving out its due proportion of heat for useful effect; and how, are questions deserving a solution.

Respectfully submitted,
C. R. WELLS,
Jeffersonville, Madison & Indianapolis Railroad,
C. R. PEDDLE,
Terre Haute & Indianapolis Railroad,
S. J. HAYES,
Illinois Central Railroad,
Pittsburgh, Fort Wayne & Chicago Railroad,
L. S. YOUNG,
Cleveland, Columbus, Cincinnati & Indianapolis Railroad,
Committee.

We have already published a brief report of the proceedings of the first day's session of the Convention, with some of the reports presented. The above report begins with the second day of the Convention.

After the presentation and adoption of resolutions reported by the committee on the death of Mr. Pierce, the PRESIDENT announced that the next business in order was the discussion on the report of the committee on boilers, which had been read the previous day.

DISCUSSION ON BOILERS AND FIRE-BOXES.

Mr. WOODCOCK, Central of New Jersey, said that the most important question now was to find a remedy for the cracking of steel fire-box plates, which gave them so much trouble. They were not all of them prepared to receive the suggestions of the report. In a recent conversation with his Superintendent he had referred him to the cost of steel fire-box repairs as a large item. Their officers looked to them to find some remedy for this trouble. Engines built of the same material, at the same time and used in the same service would not last alike. He had now in his shop an engine which had run 254,000 miles; another of the same class, put in service at the same time, had had during its service, about seven years, two new fire-boxes, the first running 95,000 and the second 117,000 miles. In the first engine, in one of the side sheets, he had found 10 cracks, varying in length from 1 to 10 inches. They all started from stay-bolts, as described in the report. To all appearances the steel was just as tough as any you could find. In another engine, which required a new fire-box after running 106,000 miles, he found that he could not bend cold a

piece cut out of one of the side-sheets; it broke like cast iron. After heating it red-hot, however, it could be bent down flat. He thought that if they could anneal the sheets in the fire-box it might restore them to their original condition. Some change certainly took place by heating. They had engines that had run over 200,000 miles and the fire-boxes were still good, while other engines exactly like them and doing the same work would not make 100,000 miles. He believed that there was something in the thickness of the sheets. They had several freight engines with side-sheets of steel 3/4 inch thick, that had made about 108,000 miles and but one of them had cracked, and that crack was 23 inches long. Other engines with 5-16 inch steel sheets had nearly all had cracks. He had no doubt that 3/4-inch sheets gave the best results. With respect to corrugating the side-sheets, he had begun to try it and believed that he should be able to report good results after a time.

Mr. WELLS, Jeffersonville, Madison & Indianapolis, hoped that the report would be freely criticised. He believed that the hardening of the sheets was due to the expansion and contraction referred to in the report. He thought that the strains caused by unequal expansion produced the hardening of the metal.

Mr. ROBINSON, Great Western of Canada, said a number of master mechanics were on the right track to overcome the difficulty. He thought that the first trouble lay in the material. The more nearly they could get a material like copper the nearer they would come to avoiding fractures. Iron and steel gave way, and steel underwent a change. He believed that they wanted a homogeneous metal, equal throughout, not fibrous but equally strong in all directions. This homogeneous metal should be steel of a very low grade. He believed that

sample and a record kept. In that way they could arrive at a knowledge of the best possible material for steel furnaces. Unless they did that they were working in the dark. The differences were more in the quality of the plates than the working of them. Corrugation would only mitigate the evil, not remove it. If they had a material as elastic as copper it would be just what they wanted, but he thought that in looking for it in steel of a low grade they were looking in the wrong direction.

With regard to the form of the fire-box, he thought it a good recommendation that the furnaces should stand inward from the top, so that the particles of steam can rise perpendicularly to the surface of the water. In that way the heat can be carried off without endangering the plates. No form of plates or quality of material will guard against the bad effects of the accumulation of scale, for scale is a bad conductor, and where-over it collects the material is likely to give out.

Mr. COOPER thought that a great trouble was that fire-box plates were made too thick. He had never had trouble with 1/2-inch plates. On the Hannibal & St. Joseph, where the water was very bad, they had one engine with 1/2-inch steel plates which had run since 1869 and was still in good order. On his present road during the past year he had put 13 patches on 5-16 inch steel. He had almost given up faith in steel, but during the last year he had put in three fire-boxes of 1/2-inch steel which were doing very well.

Mr. WOODCOCK referred to Mr. Hudson's suggestion as to keeping samples of sheets; he had acted upon a similar one made at the last Convention and now cut a piece from every sheet, marked it and preserved it for test in case of failure of the sheet. There were always pieces sheared off that could be kept without expense.

Mr. HUDSON wished to impress the importance of testing these pieces by chemical analysis to ascertain the precise amount of sulphur, etc., that they might arrive at a knowledge of the material giving the best results in practice.

Mr. CLARK, Northern of Canada, thought that at present the steel-makers were going it blind as to the proportions of sulphur, etc. He thought that in a short time they could come to a definite conclusion and then they could get sheets fitted for different classes of work. At present it was all chance whether they got sheets of uniform grade. The Grand Trunk had steel from Park Brothers, of Pittsburgh, of which not a sheet cracked.

Mr. BARRETT, Grand Trunk, said they had 90 engines with steel fire-boxes, of which 25 were Park steel. They had 20 engines with cracked sheet, but none of the Park steel had cracked. None of them had been running over two years; the water used in them was very bad. They had no sheets less than 5-16 inch thick, but had used 1/2-inch steel for patches, which had stood well. They had had 30 or 40 cases of bulging between the stays, including all the cracked ones.

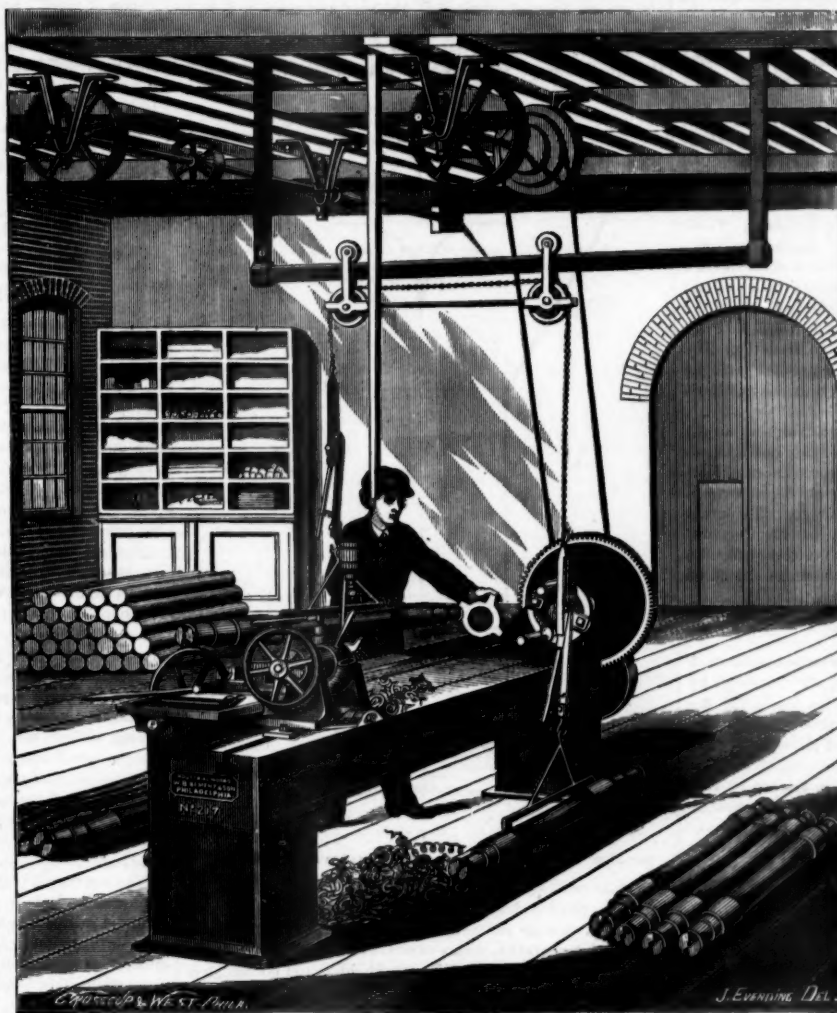
Mr. WELLS said that the reports made to the committee showed that there were about 20 sheets cracked which were 1/2 inch thick. Of these 20, he thought 15 or 16 were on the Western Division, Pittsburgh, Fort Wayne & Chicago, the rest on the Illinois Central, those being the only roads reporting cracked 1/2-inch sheets.

Mr. HUDSON said that he had no knowledge of steel sheets bulging unless overheated from accumulation of steel or some similar cause. He understood that Park Brothers' steel had a higher proportion of carbon than that of the other Pittsburgh makers. Steel makers generally kept their proportions to themselves, hence the importance of knowing what the sheets ought to be. It was a fact that two steel makers would work on the same general plan, use nominally the same materials in the same proportions, yet the one would turn out good reliable steel, the other poor. Instead of being what they ought to be, steel plates were very uncertain.

Mr. COOLIDGE, Fitchburg, thought that the matter was much more simple than was supposed. Where the water was very bad the proportion of cracked sheets had been as high as 13 per cent.; where the water was pure, the proportion was very small. He understood the committee to recommend sheets 1/2 inch thick instead of 5-16 inch. He thought that with good water there was little trouble with steel. At any rate the worst results

they had had with steel were better than they had ever had with iron. They were very much in the hands of the manufacturers, but he thought the worst steel they had given them was better than iron.

Mr. SEDGLEY, Lake Shore & Michigan Southern, said that his road had adopted steel altogether. Instead of laying his troubles upon the manufacturers, he took them, in great degree, to himself. In one case where they put 20 engines on the road in 1874, when the line was crowded with business and the first year the engines made from 30 to 40,000 miles each, and have been in constant service, only two or three have been removed. These engines had crucible steel. That steel had given them the best results they had ever had. Since Bessemer steel came into use they had used it largely, but he doubted whether they would get the same service from it as from crucible steel. It would take time to decide, however. He wished that the committee had said something about the degree of heat required to make a sheet contract. He had made some experiments himself and did not believe that you could force the sheet to contract at the center with any temperature they ran steam at. They had four gauge-cocks at the side of their furnaces. They found that within 1/2 inch of the inside plate they could get steam when the engine was not working. When the engine was working they got almost pure steam. Withdraw the gauge-cocks 1/2 inch and they got one-third water; 1 inch and they got half and half; further than that and they got solid water. He was convinced that they were driving the water from the sheet and leaving it exposed to the fire. He thought that was the great secret of cracking. He did not think that there would be any perceptible effect on the sheet under 500 degrees. When he saw the liability and almost certainty of forcing the water away from a 1/2-inch sheet he dared not risk it. When steam was 140 pounds they would not touch 500 degrees and he did not think a lower temperature would force the sheet to contract. He thought the manufacturers were entitled to credit for the material they made. He did not think a 4-inch water-space would help them, for the water would be forced away from the sheet as much as in a 3-inch space. He thought their only hope was in corrugating



THOMAS' AXLE-LATHE HOIST. (See Page 240.)

the plates. It was simple, did not cost more than \$5 to \$10 for an engine, and they had engines which had run 30,000 miles with these plates and were as good as new.

The next question was how to keep a solid body of water against the inside plate. He believed, from careful observation, that they concentrated the heat against the back end of the arch, and it was there that plates generally cracked. He was now experimenting with a gauge-cock placed at that point. He did not believe it possible to use steel of low grade, for they got steel that worked more like copper than anything else. The trouble was not with the material; they had upset it with too great a degree of heat, and then it cracked when it got cold. He believed that the degree of heat of steam at 140 pounds pressure would not hurt a plate.

[TO BE CONTINUED.]

Thomas' Axle Lathe Hoist.

(See Page 239.)

The engraving represents a very useful device which has now been in use in the shops of the Chicago & Northwestern Railway for over a year. The principle of this appliance is, that the weight of a finished axle or other heavy object to be removed from a lathe or other machine shall counterbalance that of a rough axle which is to take the place of the finished one, and that thus the one can easily be removed and another put in its place by one person. To do this a horizontal bar is attached by suitable brackets or hangers above the lathe and crosswise to its bed. On this bar two wheels run, to each of which a pulley or sheave is attached by a suitable hanger. These pulleys are separated far enough apart so that one end of a chain passing over each of them will hang about the centre of the lathe-bed, and can be attached to an axle in the lathe, whereas an axle attached to the other end will swing clear of the lathe. A suitable cradle is attached to each end of the chain to receive the object to be moved. If now an axle is placed in each of the cradles, the one axle being supported by the lathe centres, it is obvious that before the one on the floor will counterbalance the weight of the other in the lathe, a certain amount of slack must be taken up in the chain. To do this a clevis is fastened to each end of the chain, to which a lever is pivoted. To the end of the short arm of this lever a rod with a hook at the opposite end is attached by a pin, and the cradle is suspended to the hook. By pressing down the long end of the lever the axle on the floor is raised, and will then counterbalance the weight of the one in the lathe. The lathe centres can then be released, and the finished axle be swung out and upon the floor, while a rough axle is put in its place.

This arrangement is applicable to any other objects, as car wheels or tires, and seems to be a very ingenious and convenient device. It is the invention of Mr. Nicholas Thomas, foreman of the machine shop belonging to the car department of the Chicago & Northwestern Railway in Chicago. The patent is in the hands of Mr. J. Snowden Bell, No. 702 Chestnut street, Philadelphia, who is the agent and attorney for the inventor, and to whom business communications should be made.

Cast-Iron Smoke Stack.

It was found that the upper part of a sheet-iron smoke stack which contains a spark arrester is very rapidly destroyed by the abrasion of the sparks thrown against the top by the deflector. To overcome this difficulty the tops now are frequently made of cast iron, which resists the action of the sparks better than wrought iron, both on account of the material of which it is made and also because these parts are made thicker of cast than of sheet iron. When made of cast iron they can also be made of any desired form with greater facility and less expense than is possible with sheet iron, and being thicker, fewer bolts are required to fasten the top part to the bottom than are needed with sheet iron.

The engraving represents a form of smoke stack used by Mr. Thompson on the Eastern Railroad, and although it has no special features of novelty, excepting perhaps its form, it will doubtless be interesting to some of our readers. The form of the outer shell, it will be observed, is curved where the two parts are fastened together by the flanges, and thus it gives more space for the escape of the smoke and sparks through the wire netting than is possible if made of the usual form. Mr. Thompson says that only eight bolts are needed with a cast-iron stack of this kind to hold the two parts together, whereas if made of wrought iron 24 are required, and therefore only one-third this time is required to remove the top.

The lower pipe is made of sheet iron and of equal diameter all the way up. The draft, we believe, would be improved if this part were made tapered, that is, about three or four inches larger in diameter at the upper than at the lower end.

Contributions.

Massachusetts Railroad Legislation.

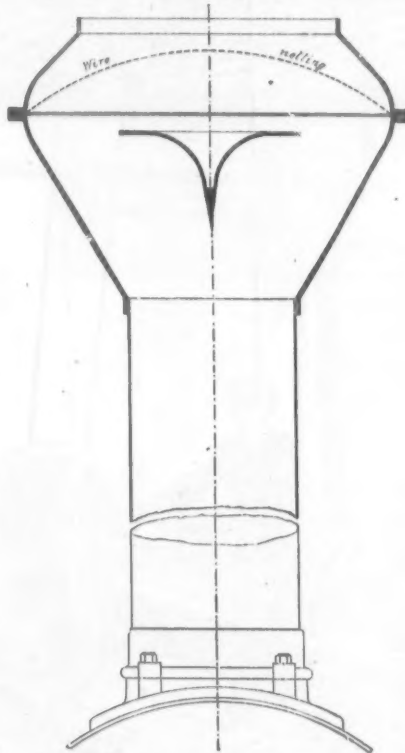
Boston, May 17, 1876.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Massachusetts has the credit of being the worst law-ridden State in the Union, but the General Court, which has just been prorogued, left a shorter blue-book behind it than any of its predecessors since the war, and its record shows to advantage compared with that of some of its predecessors. Considering that there are 2,450 miles of railroad in this State, representing 3,788½ miles of single track, with an average of a mile of track to every 900 inhabitants—the largest average known in the country—it will be seen that railroads must necessarily take a lively interest and exert a strong influence in the proceedings of the Legislature.

The most important act of the session is a special law for the relief of the Eastern Railroad Company—a law by which the creditors of the road agree to forego part of their interest and allow the road to continue in the hands of the stockholders, thereby avoiding not only bankruptcy but a receivership. The reckless extravagance of former boards of directors have sad-

dled the road with a debt so large that at present it cannot pay the interest on it, much less a dividend, and this, too, with a constant and rapid increase of business since 1871, when it was paying 7 per cent. dividends. The act authorizes the mortgaging of the road with all its property and franchises to three trustees to be appointed by the Supreme Court, who shall issue thirty-year gold bonds bearing 3½ per cent. interest for the first three years, 4½ per cent. for the next three years, and 6 per cent. thereafter. These bonds to be exchanged for all indebtedness of the corporation of whatever nature, persons whose debts are not admitted having the right of appeal to the courts. Within sixty days after the mortgage has been recorded, meetings of the stockholders and the bondholders shall be called, and the former shall choose three and the latter, having one vote for every \$100 of debt, six directors to serve as a new board of directors. Similar annual meetings to be held until the total amount of bonds outstanding shall be reduced to ten millions, when the power of the holders of certificates of indebtedness to elect directors shall cease. The corporation, with the consent of the trustees, may sell any and all property of the corporation not essential to the running of the road and apply the proceeds for the payment of interest, running expenses and the discharge of all incumbrances, and after that for a sinking fund which after September, 1882, shall also receive all the net earnings of the road and shall be held for the redemption and cancellation of these certificates of indebtedness. In case of a default in the interest for six months, the trustees may, and in case of a default for twelve months



Smoke Stack Used on the Eastern Railroad.

shall, take possession as receivers, and in case of a default for two years, the foreclosure shall be complete, the rights of the corporation forever extinguished, and the bondholders shall form a new corporation with a capital stock equal to the outstanding mortgage bonds. [The stockholders and bondholders have accepted this act, and the trustees will be announced in a few days.]

Next in importance comes an act recommended by the Railroad Commissioners in their report. They asked for its passage on the ground that railroads are no longer private corporations; that they were public corporations to the extent that the public has a right to know just how they were managed. With this publicity, such a disgraceful system of management as that of the Eastern Railroad would never have been possible. Then, too, the system of accounts has been so loose that there was no way of framing questions so as to secure returns from which proper results could be arrived at. For instance, the construction account of the Eastern road increased in one year over a million and a half, without a mile of new track. According to the construction account of the Boston & Providence, their passenger cars cost less than \$400 a piece, while another road returns them as costing \$5,000 each, and the percentage of operating expenses to gross receipts on two roads paying equally well, vary 75 per cent. The act, which was passed as recommended, provides that the Commissioners shall prescribe a system on which accounts shall be kept, shall from time to time examine the books to see that they are kept in accordance with this system, and shall appoint a skilled accountant to supervise the work under their direction. The board shall, at the request of one director or at the request of persons representing one-fiftieth of the capital stock, at any time cause an examination of the books to be made and the results published in a daily paper in Boston. The Board shall also have access at all times to the list of stockholders. Penalties are provided for non-compliance with this law.

It is well known that the Board of Railroad Commissioners has had no authority to do anything but suggest heretofore. Now that its usefulness has been proved, besides those conferred in the act just mentioned others powers have been given it. Hereafter there are to be no new crossings at grade without their consent as well as that of the county commissioners,

it being found that the county commissions were always very ready to let the railroads do about as they pleased. They are also to adjudicate whenever a change in grade crossings is asked for. They are also instructed to inquire whether coal freights from the Hudson to Berkshire County have been higher than to Springfield and Worcester, which are further off but are blessed with competing lines. The Board is also forbidden by a new law to render any professional services or to have any dealings where money or reward passes, with railroad corporations.

Towns are hereafter limited as to the amount they may subscribe to railroad corporations. They can never incur any liability which with other debts shall increase their total debt to 3 per cent. of their valuation. They may establish sinking funds to pay railroad debts and shall levy an annual tax sufficient to pay the interest on such debts.

Other laws provide that special meetings of corporations shall be called at the request of 30 stockholders or of stockholders representing one-tenth of the capital stock; that no road shall issue bonds running over twelve months without legislative consent; that the treasurer and superintendent, as well as the directors, shall swear to the correctness of the annual returns required by law; and punishing by heavy fine and imprisonment any interference with electric signals.

There are now 63 railroad companies in the State—an increase of three. Laws were enacted authorizing the Boston & Maine to purchase three roads which it has for a long time operated under lease, owning a majority of their stock—the Newburyport, Danvers and West Amesbury roads. The consolidation of the Fall River road with the Old Colony, the New Bedford or the Boston, Clinton & Fitchburg, is authorized; also the purchase of the Fall River, Warren & Providence by the Old Colony. The lease of the Springfield & New London to any connecting road is authorized, also its entrance upon the tracks of the Boston & Albany in Springfield. Provision is made for the holding of stock in the Union Freight Railway by any connecting road, and for the construction of a road from Billerica to Bedford with a two-foot gauge.

Efficiency of Duty in Locomotives.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The conundrums propounded by Mr. Kingsland, in your issue of May 12, are altogether too complex to be solved or explained in a newspaper article. The locomotive referred to is very light, only weighing 18½ tons, 14 inch cylinders, common lap slide valve, with link motion, and is below the tens on a road now owning nearly 400 engines. Though more than twenty-five years old, she has been miraculously spared from the vandal hands of rebuilders, and gets along now with a surprisingly small expenditure for repairs. Her power is astonishing, and she has repeatedly run fifty-five miles an hour.

As they know nothing about any other style of engine, very few locomotive engineers have any conception whatever of the enormous loss of power by using the slide valve. Careful experiments by Favre, Silbermann, and others, have proved that one pound of good coal will liberate heat enough to run an engine of one-horse power for five hours. In actual practice, less than one-tenth of this duty is realized, the rest being wasted through imperfect combustion, too perfect radiation, useless friction, and loss by heating steam too hot. All these glaring defects are fearfully multiplied in the locomotive, as was shadowed forth in an article entitled "The Locomotive," published in your paper of April 21. Even in propellers, where the boilers and engines are enclosed in tight hulls, the tables of Hunt and Skeels show that but 6.2-3 per cent. of the steam power is utilized for duty. All the rest is wasted and thrown away.

We have certainly progressed backward in locomotive engineering in the last 30 years, as well as in some other departments of railroad outfit. Locomotives are not nearly as powerful, in proportion to the increased weight and enormously increased consumption of fuel, as they were then. Defects in proportions have been increased and adhered to with dogged obstinacy.

The writer is very positive that, if given the chance, he can increase the hauling capacity of the standard 30-ton locomotive from 10 to 20 per cent. Exactly how much, he has had no opportunity to ascertain. The changes to be made will not cost more than \$60 an engine.

In proving the deterioration of modern railroad material your paper bears ample testimony. Last August you showed section drawings of an ordinary iron T rail which had been in use 20 years in the main track of the Camden & Amboy Railroad and 20 years more in sidings. Forty years' use of iron rails between the two greatest cities on the continent! Where is the iron now that will begin to equal this? Even so-called steel is only guaranteed for five years.

Quite recently you published an account of a rail from the Dayton & Michigan road, 19 years old, and good yet, which had been sent to the Centennial Exposition. The writer knows of iron rails now in main lines, perfectly good, 20 and 25 years old, and not weighing more than 45 lbs. to the yard. The Camden & Amboy rail weighed 42 lbs.

Our correspondent is, we think, not so careful in making some of his statements as he should be. Thus, he speaks of "the vandal hands of re-builders." Now why are all re-builders "vandal?" and if they are not all vandals, what proportion are? and what is it that gives that barbaric adjective its appropriateness? and again, what reason is there for believing that overheating steam is a cause of waste? Just the reverse is ordinarily supposed to be the case.

It is true that only a very small percentage of the potential power in coal is utilized in modern steam engines; but how does "Expert" propose to remedy this, or what improvements will he make which will increase the hauling capacity of locomotives from 10 to 20 per cent? Vague

general statements of what can be done "if he had a chance" will hardly induce railroad managers to engage his services. We agree with "Expert" that the efficiency—that is hauling capacity—and economy in fuel consumption of locomotives could be very much improved, and what railroad managers would like to know—at least some of them—is how to do it, which "Expert" has not shown, but has called hard names instead.—EDITOR RAILROAD GAZETTE.]

Accidents from Misplaced Switches.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In obedience to an injunction of Mr. Huntington, which appeared in a recent impression of your valuable paper, your correspondent has taken "another look at the figures," and is very much impressed with the importance of facts there stated; and it is unnecessary to look further than the first line for sufficient material to generate a train of condemnatory thought, as it is there proclaimed that 81 accidents, caused by misplaced switches, were reported as occurring in the year 1875; and although the nature of them is not there stated, yet a reference to your more complete record establishes beyond a doubt the certainty that such accidents are usually of a serious character, resulting in loss of life and the destruction of large masses of valuable property. It is assumed that whenever an accident of this kind occurs, the following queries are evolved: May not some of these be prevented by the use of some simple mechanical contrivances, within reach of all roads claiming the most inconsiderable degree of importance, and would it not be economy for the executive committee to detail one of its officers to investigate the causes of so many accidents, and to determine and fix, if possible, the responsibility, which is believed to rest, in nine cases out of ten, in a defective method of operating signals in conjunction with the switches? While it is not proposed to offer any comments upon the merits or demerits of any one or more systems, in answer to the above, it is the object of this communication to respectfully solicit the attention of railway managers to what at present writing appears to be a fact, "That there is now in use a general system (the details of which as worked out by different engineers present quite a varied aspect) of working signals and switches in such a manner that instead of 81 accidents in one year by misplaced switches, there shall be none;" and in order to attain results so desirable, no large expenditure is required, as at any junction or station where that class of accidents generally occurs there are say from 5 to 15 men employed at an average of \$40 per month each for working the switches. Supposing for the purpose of illustration that 10 men are necessary, this makes a total pay-roll of nearly \$5,000 per annum, for which sum a mechanical apparatus may be substituted that, with the aid of but one ordinarily intelligent workman, the entire labor of signaling and moving the switches of so large a station may be accomplished, which by a simple calculation can be proved to reimburse in one year the company venturing the outlay, and ever after prove a source of income, besides checking completely the liability for collision or destruction of rolling stock by misplaced switches.

It is conceded that legislative aid has without doubt been productive of great good to the users of railway equipment, yet it is not proposed to invoke that power to promulgate the views entertained by the writer, but rather an appeal is made to the desire for increasing the facilities of existing lines that is paramount in the minds of progressive managers, as well as to render transportation less dangerous to life and property and also to that peculiar characteristic of owners, savings, as it can be clearly shown by any well informed engineer that the employment of the "interlocking principle" (as used to so large an extent in Europe) at every yard or station where more than one person is necessary for turning the switches will almost immediately effect a saving and a continuous income.

In conclusion, there can indeed be no doubt that methods of working mechanical contrivances the value of which has been thoroughly ascertained may be had to fulfill the following requirements:

1. The signal and switch levers at any junction should be brought together and under cover upon a raised platform enclosed with glass.
 2. They should be so arranged that while the signals are at danger the switches shall be free to move.
 3. That a signalman shall be unable to lower a signal for the approach of a train until after he has set the switches in the proper position for it to pass.
 4. That it shall not be possible for a signalman to exhibit at the same moment any two signals that can lead to a collision between two trains.
 5. That after a signalman has lowered a signal to allow a train to pass, he shall not be able to move a switch so as to cause an accident or to admit of a collision between two trains.
- When from 1 to 5 inclusive have been fulfilled, it is believed that the reporter of accidents caused by misplaced switches will be like Othello—his occupation gone. S. H. FINCH.

New York, May 29, 1876.

ELECTIONS AND APPOINTMENTS.

New York Elevated.—The board has elected John F. Tracy President, to succeed Milton Courtright, who becomes Vice-President and Chief Engineer. Mr. Tracy was President several years until last year.

Louisville, Cincinnati & Lexington.—A recent notice of the appointment of Mr. John Kilkeny as General Passenger and Ticket Agent was not entirely correct, as appears from the following circular:

"Mr. S. S. Parker having resigned the position of General Passenger and Ticket Agent of this road, John Kilkeny has been appointed General Passenger Agent and C. B. Kelly General Ticket Agent; both appointments to take effect this date. Correspondence relative to passenger business should

be addressed to Mr. Kilkeny. Correspondence relative to tickets, rates and divisions should be addressed to Mr. Kelly. Passenger and advertising agents, local and foreign, in the employ of this company will report to Mr. Kilkeny. Headquarters of both departments at Louisville, Ky."

Carolina Central.—It is reported that Gen. Wm. McRea, now Superintendent of the Western & Atlantic road, will shortly succeed Col. S. L. Fremont as General Superintendent and Engineer of this road.

Nashua & Rochester.—At the annual meeting in Nashua, N. H., May 25, the following directors were chosen: Charles Williams, Aaron W. Sawyer, A. H. Dunlap, Nashua, N. H.; J. C. Eastman, Hampstead, N. H.; N. V. Whitehouse, Edwin Wallace, Rochester, N. H.; J. C. Parley, Epping, N. H.; George P. Westcott, Portland, Me.; C. E. Whitin, Whittinsville, Mass.; C. H. Walters, Groton, Mass.; F. H. Kinnicut, F. H. Dewey, Charles W. Smith, E. B. Stoddard, C. S. Turner, Worcester, Mass. The road is leased to the Worcester & Nashua. Gen. Aaron F. Stevens was chosen clerk.

Northern (New Hampshire).—The thirty-first annual meeting was held in Concord, N. H., May 25, and the following directors chosen: Onalow Stearns, Josiah Minot, Concord, N. H.; Edward Lawrence, Charlestown, N. H.; G. W. Nesmith, Franklin, N. H.; John A. Burnham, Urie Crocker, Charles F. Choate, Boston.

Suncook Valley.—At the annual meeting in Manchester, N. H., the following directors were chosen: Samuel N. Bell, Frederick Smythe, M. V. B. Edgerly, Manchester, N. H.; Natt Head, Hooksett, N. H.; Lemuel B. Towle, Epsom, N. H.; Charles H. Carpenter, Chichester, N. H.; Reuben L. French, Pittsfield, N. H. The board elected S. N. Bell President and L. W. Clark, Clerk. The road is leased to the Concord Company.

California Railroad Commission.—The Governor of California has appointed as members of the commission established by the law passed by the late Legislature, Gen. Stoneman, of Los Angeles; John T. Doyle, of San Mateo, and Isaac W. Smith, of San Francisco. Gen. Stoneman is, we believe, a graduate of West Point; he and Mr. Doyle are old and well known residents of California. Mr. Smith has not been long on the Pacific coast; he is a civil engineer, has been engaged on several Eastern roads and on the Willamette Canal in Oregon.

Bedford, Brownstown & Madison.—This company was recently organized in Bedford, Ind., by the election of the following directors: W. C. Benton, J. A. Stillwell, John Scott, Wright Vermilyea, W. Fryminger, E. D. Pasley, T. J. Bower, E. Boughman, J. T. Deal, T. B. Boyatt, Preston Rider, W. H. Warner, W. H. Irwin. The board elected W. H. Irwin President; W. C. Benton Vice-President; Wright Vermilyea Secretary.

San Francisco & North Pacific.—A new company by this name has been organized in California with the following directors: Charles H. Cummings, Mark Hopkins, C. F. Huntington, E. M. Miller, Jr., Leland Stanford.

Railway Passenger Conductors' Life Insurance Association.—At the annual convention in Philadelphia, May 24, the following officers were elected for the ensuing year: President, Wm. West, Marietta & Cincinnati; Vice-Presidents, J. M. Short, Cincinnati, Hamilton & Dayton; H. Martin, Boston & Providence; H. W. Jessup, Erie; Secretary and Treasurer, Walter Lackey, late Philadelphia, Wilmington & Baltimore; directors, W. H. Lummis, Philadelphia, Wilmington & Baltimore; William R. Kenney, Philadelphia & Reading; Lemuel Shepherd, United Railroads of New Jersey; Chas. Parker, late United Railroads of New Jersey; James Stover, North Pennsylvania; George F. Lincoln, Boston & Providence; Frank Champlin, Chicago & Northwestern; O. W. Merrill, Pittsburgh, Cincinnati & St. Louis; Wm. Murray, New Orleans, Mobile & Texas.

Peterborough.—At the annual meeting in Nashua, N. H., May 24, the following directors were chosen: James Scott, Granville P. Felt, Peterborough, N. H.; Samuel Downes, Greenfield, N. H.; G. A. Ramsdell, Gilman Scripture, J. G. Graves, A. McKean, Nashua, N. H. Gilman Scripture was chosen Clerk. The road is leased to the Boston & Lowell and Nashua & Lowell companies.

Brownville & Sebec.—This company was organized at a meeting held in Bangor, Me., May 24, by the election of the following directors: Judson Briggs, M. W. Brown, O. W. Davis, Jr., M. S. Drummond, C. L. Dunning, F. M. Ford, A. H. Merrill.

Manchester & Lawrence.—At the annual meeting in Manchester, N. H., May 26, the following directors were chosen: Ezekiel A. Straw, B. F. Martin, Nathan Parker, Aretas Blood, Manchester, N. H.; Edward A. Abbott, Concord, N. H.; Wm. W. Stickney, Exeter, N. H.; Joseph W. Smith, Andover, N. H. The board elected E. A. Straw President; S. N. Bell, Clerk; George B. Chandler, Treasurer.

Chester & Lenoir.—Mr. James Mason, of Yorkville, S. C., has been appointed Auditor, Treasurer and General Freight Agent. At the annual meeting in Yorkville, S. C., recently, the old board of directors was re-elected with the exception of L. M. Grist and J. Matthews, who are succeeded by James F. Hart, of Yorkville, S. C., and M. Falls, of Dallas, N. C.

Chicago & Pacific.—On application of some of the creditors, the United States Circuit Court has appointed James M. Whitman Receiver. He is Chief Engineer and Superintendent of the road.

United New Jersey.—At the annual meeting in Trenton, N. J., May 30, the following directors were chosen: Benjamin Fish, John G. Stevens, Robert F. Stockton, Trenton, N. J.; Ashbel Welch, Lambertville, N. J.; A. L. Dennis, Newburgh, N. Y.; Isaac W. Scudder, Jersey City, N. J.; John Jacob Astor, Cambridge Livingston, New York; Samuel Welsh, Wm. Bucknell, Philadelphia; Hon. Hamilton Fish, Washington. The only new director is Mr. Bucknell, who succeeds Mr. Wm. G. Cook.

Worcester & Shrewsbury.—At the annual meeting in Worcester, Mass., May 27, the following directors were chosen: E. B. Stoddard, Richard Barker, Walter Henry, Warren McFarland, H. H. Bigelow, D. M. Wheeler, James Draper, J. J. Coburn, George E. Haggood. At a subsequent meeting of the directors E. B. Stoddard was chosen President, James Draper, Clerk and Treasurer, and Richard Barker Superintendent.

Hoosac Tunnel Fast Freight Line.—Mr. E. S. Washburn, for several years connected with the Chicago, Burlington & Quincy Railroad, and lately Private Secretary to General Superintendent Ledyard, of the Michigan Central Railroad, has been appointed General Manager with headquarters at Rochester, N. Y.

Pacific Mail.—At the annual meeting in New York, May 31, the following directors were chosen: Charles G. Franchlyn, Andrew Boardman, Samuel G. Thompson, Charles H. Merritt, Wm. P. Clyde, Thomas J. Owens, Charles G. Melley, Henry Hart and Edward A. Quintard. This is an almost complete change, the new directors representing the Panama party, or opposition to the Gould-Dillon management. It is understood that Mr. Wm. P. Clyde will be chosen President.

PERSONAL.

—Gen. N. J. T. Dana, late Superintendent of the Quincy, Alton & St. Louis road, has been presented with a valuable gold watch by the employees of that line. General Dana is now in Florida.

—The Indianapolis Journal says that Mr. F. B. Kennedy, General Ticket Agent of the Indianapolis, Cincinnati & Lafayette

ette road, has become violently insane and that his physicians have but little hopes of his recovery. It is thought anxiety about business has brought on the terrible calamity.

—Mr. Cummings, Master Mechanic of the Copiapo Railroad in Chili, was recently killed while running a train down a very heavy grade. The train struck a rock which had fallen upon the road, and was thrown from the track.

TRAFFIC AND EARNINGS.

Railroad Traffic.

The freight traffic of the Utah Central and Southern roads for April was as follows:

Utah Central, tons.....	9,764
Utah Southern, tons.....	6,885
Total.....	16,649

The Central carried 4,079 tons coal and coke; the Southern, 2,802 tons of ore and bullion.

Lake and Canal Rates.

Thursday of last week the rate on wheat by canal from Buffalo to New York was 6½ cents per bushel, ½ cent lower than had been reported theretofore; but the ruling rate down to date seems to have been 6½. The same day the Elevator Association came practically to an end, and rates for elevating which opened at 1 cent per bushel, and afterwards were reduced (regularly) to ¼ cents, and again to ½ cent, became ½ cent. With 2½ cents as the lake rate from Chicago to Buffalo, which has been steady for the week, this made the charge from Chicago to New York by the lake and canal route 8½ cents, against 12 cents by the all-rail route and 11 cents by the lake and rail routes (propeller to Erie and Buffalo and rail thence to New York. At the same time the rail rate on wheat from Buffalo to New York was said to be firm at 7 cents. This is much lower than the usual canal rate, but it is higher than the current through rail rate from Chicago to New York. By this, the proportion from Buffalo to New York is but 5.44 cents. The New York railroads, apparently, profit much more from the business which they receive from the Lake at Buffalo than from that which they receive from the railroads at Buffalo and Suspension Bridge, and can afford to underbid the present canal rates rather than take through rail shipments.

Lumber is carried from Muskegon to Chicago at \$1 per thousand. At Buffalo it is reported that 50 cents per ton, and sometimes 60 cents, is offered for carrying coal to Chicago, but refused. Vessels have been carrying iron ore from Marquette to Cleveland on old contracts at \$3 per ton, but the current rate from Escanaba is but \$1.25, and when the Marquette contracts have expired, which will be after a few trips, \$1.40 to \$1.50 per ton is expected to be the rate.

THE SCRAP HEAP.

Railroad Manufactures.

The United States Circuit Court has instructed the assignee of the Southwestern Car Works at Jeffersonville, Ind., to lease the machinery and other property to the best advantage until a time when the property can be disposed of more advantageously than now.

The Detroit Bridge and Iron Works are constructing a 250-foot span for the bridge over the Mississippi at Hannibal, to replace the one lately carried away.

The Roane Iron Company, at Chattanooga, Tenn., has nearly completed a heavy order for rails for the Little Rock & Fort Smith road, and has a number of other orders on hand.

The Louisville (Ky.) Car-Wheel Works are very busy, with a large number of orders to be filled.

The Lake Shore Boiler Explosion.

The Chicago Journal of May 20 says: "Residents in the vicinity of the Lake Shore & Michigan Southern Railroad depot were startled about 7:40 o'clock this morning by a terrific concussion, as if a number of pieces of heavy artillery had been discharged simultaneously. For several blocks the shock was felt and windows were broken. Considerable excitement resulted and people hastened from their homes fearing they were about to tumble down and bury them in the ruins. It was soon ascertained that the boiler of a locomotive had exploded, and the natural supposition was that great damage to persons and property must be the result. People flocked to the locality where the explosion occurred, and found a state of affairs that seemed to justify the surmises of serious damage. On a side track about 100 feet south of Harrison street, stood the wreck of the Lake Shore & Michigan Southern engine 87, known as 'The Commodore,' and for a couple of blocks around were seen pieces of the wreck, while five men were found to have been more or less injured. It seems that the locomotive had been backed up on the side track preparatory to taking out passenger train 4, and was waiting for the train. While the engineer, W. R. Brewer, was in an adjacent building, and the fireman, William Stafford, was standing about 25 feet away, the boiler exploded. The explosion was in the lower portion of the boiler, which is supposed to have been weakened by burning. The explosion drove the machinery under the boiler down on the track with such force as to break the rails and curl them up like sled-runners and the reaction raised the boiler clear out of the flues, tearing it all to pieces and scattering the fragments in every direction. The top of the boiler and the steam cap were carried into Henry Karber's stone-yard, on Fifth avenue and a block and a half away, where they came in contact with a derrick and cut it off about fifty feet above the base. Had it not been for this obstruction the flying missile would have been hurled into a residence beyond the stone yard and might have killed several inmates of the house. Another piece of the boiler was thrown into a yard on Third avenue, two squares distant. Still another piece dropped through the roof of Lottie Whitney's house of ill-fame. Smaller pieces played sad havoc with roofs and windows on Sherman street and Pacific avenue. "At the time of the explosion a gang of trackmen were at work within a few feet of the engine, and five of them were injured, this being all the damage done to persons. "The engine was built at the Elkhart shops in 1871, and was a first-class passenger engine warranted to carry 130 pounds of steam. At the time of the explosion the engineer says there was not over 115 pounds of steam on. "The cab of the engine and the tender were but slightly damaged, but that portion immediately around the boiler is a total wreck. As the engine was on a side track no delay was occasioned to trains and the damage to the track was immediately repaired.

A Dead Beat.—The St. Louis Republican of May 25 says: "A man named John Mason, who has been carrying on a neat operation in railroad passes on the Iron Mountain Railroad, was arrested yesterday by an attaché of the road. When taken to the Four Courts he confessed the swindle and explained to the chief the manner in which it was carried on. His plan was to forge the name of A. W. Soper, the General Superintendent of the road, to requests for passes to various points on other roads, using in each case the regular printed letter-head of the company. So clever was the forgery that a large number of passes were obtained, on which Mason traveled over the roads. He is described as a genteel-looking young Canadian. Mr. Soper says he intends to prosecute him."



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Editorial Announcements.

Passes.—All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.

Addresses.—Business letters should be addressed and drafts made payable to THE RAILROAD GAZETTE. Communications for the attention of the Editors should be addressed EDITOR RAILROAD GAZETTE.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

THE LOW RATES.

The condition of through traffic, so far as rates are concerned, is now about as bad as it can be. When east-bound rates were broken in April, though these covered three-fourths of the freight business and were lower than last year even, it was a subject for congratulation that west-bound rates were maintained, and that passenger rates, at a season when passenger traffic was likely to be unusually large, were not affected. By this time, probably, these causes for rejoicing that very bad was no worse have ceased to exist. At all events this is true of passenger rates. The Grand Trunk had made (as it usually does every summer for round-trip tickets) very low rates to Boston; some of the New York roads charged that others were cutting rates in taking parties to and from New York, and on Sunday the New York Central announced limited tickets, good for three days, from New York to Chicago at \$17—a reduction of \$5; the Erie followed this announcement by making the rate \$16, and this has become the general rate in both directions—equivalent by the shortest route to 1½ cents per mile for an extremely costly service, in which on the average probably a ton and a half or two tons of car are carried at express speed for every passenger. Meanwhile west-bound freight rates are uncertain. The New York companies recently renewed a pledge made some time ago that they would not make long contracts at reduced rates, notwithstanding which the agents of the companies seem to agree in believing that everybody (or everybody but themselves) is making such rates and is cutting rates. At Boston the Baltimore & Ohio is said to have taken considerable Western shipments, which were sent by sea to Baltimore, at reduced rates to such an extent that the Boston & Albany and the Vermont Central were talking of joining hands in measures against this new rival—a sight which railroad men will probably smile to see, as they are not accustomed to find these two companies dwelling together in unity. It is not improbable that by the time this appears the railroads will generally and openly take freight from the seaboard west for whatever they can get—which generally means something like fourth-class rates for all merchandise.

Still, the effect of this demoralized condition of things on the profits of the companies will probably be exagger-

ated, as it certainly has been heretofore in much that has been said on the subject. The passenger reduction is regrettable, because through passenger business is not usually profitable, or but slightly so; but after all, the railroads were not getting full rates this year. The reduction in Centennial tickets amounted to one-fourth, and brought down the Chicago rates from \$22 to \$16.50, which is but half a dollar more than the new rates for limited tickets. Nothing can prevent the use of these Centennial tickets for ordinary traffic. The purchaser of a ticket from Chicago to New York can buy a round-trip Centennial ticket and sell the New York to Chicago part in New York. This industry was giving occupation to the race of scalpers to some extent—an occupation which will hardly prosper since the reduction in single tickets.

So far as a reduction in west-bound rates is concerned, it is wholly a misfortune: these rates ought to be higher instead of lower; but then this is comparatively a small business, and at this season of the year, the spring business being over and the fall business yet to begin, it is absolutely small. Hardly a pound more will be shipped if rates are made ever so low, but there will not be a very large loss on a very small business; and it is to be hoped that the trouble will come to an end before the fall business opens.

The great business is the through traffic eastward, most of which has been carried now for more than a month at the rate of twenty cents per hundred from Chicago to New York—less than half a cent per ton per mile. Insufficient and unprofitable as this rate is, its effect has been greatly magnified in the popular mind. Comparisons between the receipt at this rate and the average expense per ton per mile are made (very properly), and the difference given as a demonstrated loss, no account being taken of the fact that the expense per ton per mile of through freight over a route 900 miles long is a very different thing from the average expense per ton per mile of all freight; nor of the further fact that the addition of a large amount of through traffic on a route already provided with equipment and appliances is made at a cost very much less than the average expense of the previous through traffic even. This latter fact needs to be emphasized. Here were the roads, with a great equipment which was insufficiently occupied, a staff which needed comparatively small additions to make it capable of attending to a quarter or a half more traffic, with tracks, sidings, stations and other appliances largely unused. Now if there had been no contest, the true policy would have been to maintain rates on such traffic as the railroads were sure to get, but to reduce them on that which otherwise would not move, or move only by water, not only below the average cost, but below the average cost of through freight, down even until but a narrow margin should remain above the cost of carrying the additional freight. Something like \$1.25 per train mile has been the average expense on some of our trunk lines. But to add one, two or three to the ordinary number of trains costs nothing like this sum. Many of the items of expense are not increased at all, and comparatively few in proportion to the increase in trains. It is not impossible, we suppose, in view of the fact that no new equipment was required, that the current through rate is sufficient to cover the expense for all additions to traffic, and perhaps more: the trouble is that the reduction extends not only to the additions attracted by the reduction, but to all the freight which would have been obtained without the reduction. Now the fact is that at any rate much higher than that which has been made, the railroads would have got very little of the grain which they carried this spring, amounting in five weeks since the opening of lake navigation to more than 10,000,000 bushels. If the reductions had extended to this freight only, or to that part of it going to the seaports, it is questionable whether they would not have been advantageous to the companies. Covering as they do most of the through traffic, we can hardly believe that they cover expenses, notwithstanding the great additions to through traffic which they have caused. But to say that the Pennsylvania Railroad is losing on its through traffic because it gets but 0.44 cent per ton per mile, while the average expense was 0.616 cent per ton per mile on all freight last year, is certainly unwarrantable. With such an average expense on all freight, through and local, 0.44 cent per ton per mile ought rather to leave some margin of profit.

Moreover, it should always be remembered that the trunk lines last year passed through an ordeal much like this and really stood it very well. This year they have had the advantage of a profitable winter's business, which they did not have last year. While rates are lower on east-bound freight, the traffic (at least in grain) is much larger; and though the condition of things is bad enough, it is not nearly so ruinous as many would make it appear.

Mr. Joy's Retirement.

Mr. James F. Joy has addressed the following letter to Mr. R. G. Rolston, Secretary of the Michigan Central Company, under date of May 23:

"DEAR SIR: It is known to the members of the last two

boards of directors that it has ever been my desire that I might be permitted to retire, and that my name should not be presented to the stockholders as a candidate for re-election to the board.

"Last year my determination to retire at that time was overcome by the earnest and unanimous request of the board that I should remain at least another year.

"The year is again about to expire, and now I think I should be at liberty to retire, and must request and insist that another name shall be substituted for mine at the next election of directors.

"With the best wishes for the future prosperity of the company, yours truly,
J. F. Joy."

Mr. Joy's active connection with the company has lasted for over 19 years. Born in Durham, N. H., in 1810, and graduating at Dartmouth College in 1833, he went to Detroit in 1836 and was admitted to the bar the next year, and soon after entered into partnership with Mr. George F. Porter. His first connection with the road, with which he has been so long identified, is thus described by Mr. George C. Bates in a sketch published several years ago:

"The firm of Joy & Porter soon became the attorney and counsel of the Dwights of Boston, Arthur and Frederick Bronson, of New York, and so in 1847 when John W. Brooks came from Boston to Michigan to purchase the then Detroit & St. Joseph Railroad, he came consigned to Joy as the man to take the legal charge of all the negotiations, and to act as counsel for the new stockholders in that great enterprise. Brooks entrusted to Mr. Joy all the negotiations, and by him the purchase was made from the State, the acts drawn and passed, the purchase money secured, and the Michigan Central Railroad, now one of the best in the world, was brought into existence with Joy as the legal accoucher at its birth."

The Michigan Central Railroad was chiefly the property of Boston and other New England capitalists. Soon after it was fairly in working order to Chicago it gained a reputation as one of the best passenger routes in the country; the Michigan Southern early became involved in financial difficulties, and it will probably be conceded that until after 1860 at least it was decidedly inferior to the Central. Before the panic of 1857 the Michigan Central had the fastest trains in the country with the exception of the Hudson River Railroad, which at that time had trains between New York and Albany which made better time than the present fast mail. Not only did the Michigan Central do good work, but it made good profits, and the confidence of the capitalists who had invested in it was acquired by Mr. Joy to a greater degree perhaps than was ever enjoyed by any other railroad man in this country. He played an important part in the projecting and construction of the great system of railroads west of Chicago still generally known as the "Joy roads," chief of which is the great Chicago, Burlington & Quincy Railroad. As these lines stood a few years ago, they formed probably the best placed system in the West, and indicated marvellously good judgment in those who designed them, as for the most part they were constructed while yet the country afforded but a very feeble traffic. But to-day the Chicago, Burlington & Quincy carries to Chicago more and more various products than any other railroad. Most of the "Joy roads" occupy a territory nowhere further north than the latitude of Chicago, and nowhere so far south that they may not find a short rail outlet to New York by way of Chicago. Roads further north serve districts whose chief export is wheat, and whose traffic, consequently, depends largely on the abundance and the demand for this single crop. Roads further south, if without a lake outlet, suffer whenever lake rates are very low by the cross lines to the north, while they cause the latter to suffer when lake rates are high. But in districts lying between the latitude of Chicago and a line due southwest from that city the country, while producing wheat largely, is also a great corn country, a great cattle country and a great hog country. It is also well provided with coal. In this district are the "Joy roads." Among these was reckoned at one time the Hannibal & St. Joseph, which was the sole direct Chicago outlet of Kansas at the time when Kansas traffic was most valuable, and was lost to the Joy party just about the time when that traffic lost its chief value by its division among several new routes. An eminent success was the Burlington & Missouri River Railroad, which bids fair in no long time to surpass the original Chicago, Burlington & Quincy (with which it is now united) in the amount of agricultural products received at its stations. The Burlington & Missouri River Railroad in Nebraska, the most western of the Joy roads, promises to be a leading Nebraska road, and is now doubtless the greatest carrier in that half of the young State which is south of the Platte.

In the fever of railroad construction which succeeded the war, the two last-named roads were doubtless the most valuable of the newer "Joy roads." The chief ventures of the investors who acted under his direction were first in Kansas, where there was a mighty rush of immigration at the time, and then in numerous new branches in the territory already occupied, nearly all of them branches of the Michigan Central and the Chicago, Burlington & Quincy. The Kansas roads are now all substantially bankrupt, the Chicago, Burlington & Quincy branches have been, some of them profitable and some of them quite the reverse, and probably on the whole the company would have been better off without them, provided that they had remained un-built; the Michigan Central branches are most of them a burden on the company, absorbing a considerable part of its reduced net income, though by no means the larger part of

the fund which formerly yielded the regular 10 per cent. dividends.

The unfortunate result of the Kansas railroads, some Iowa railroads and especially the Michigan Central branches has doubtless caused great losses to many of the investors who for many years were guided by Mr. Joy's advice and judgment. So far as the Kansas investments are concerned, there seems no doubt that there was an error in judgment; there was miscalculation of the amount of traffic which the country could afford within a reasonable period at rates which would leave a margin for profit. That State is a great way from the consumers of its products, and a rate which will permit profitable production of most Western staples leaves very little margin of profit to the carrier. Moreover, the number of transportation lines has been multiplied to a degree that could hardly have been anticipated when the Joy roads were projected; and what has proved a failure with competitors on all sides to divide traffic and reduce rates might have proved a success if there had been a less rapid railroad development.

In the case of the Illinois and Michigan branches of the old roads, Mr. Joy, in some cases at least, recommended their construction, or rather the assumption of their construction by his companies, with the explanation that it was so easy to obtain money for such enterprises at the time, that the lines were almost sure to be built, and that the question for the owners of the main lines was not so much whether these lines would be profitable, as whether it would not be better to advance part of the capital and control them in the interest of the Michigan Central or the Chicago, Burlington & Quincy than to permit them to be used, as they almost certainly would be, in the interest of rival roads. Perhaps the old company would have done better after all to have had nothing to do with the new branches; but this is by no means certain. Had nearly all local rates been reduced to a level with through rates, as might have been the case, the Michigan Central would have been worse off than it is. The fact is, there could not have been so great an increase of railroads without a decrease of profits, which, under any possible circumstances, would have affected the old as well as the new roads. At least, the policy, almost universal at the time, of securing as feeders new lines that might have diverted traffic to rival roads, was one likely to commend itself to the favor of a manager careful of the interests of the proprietors of his road.

But no man can be at the head of a great enterprise while it takes a rapid downward course without being charged with the evils which occur during his administration by many of those who suffer by the results and are more or less ignorant of the causes. Mr. Joy was retired from the Chicago, Burlington & Quincy directory (he had previously withdrawn from the presidency) something more than a year ago; before the next Michigan Central election, as we were informed confidentially at the time, he affirmed his desire to retire from the presidency of that company; but was persuaded by influential stockholders to remain another year. That year is now about to expire, and, as we see, Mr. Joy announces his determination no longer to administer the affairs of the company. He is still President of some minor roads; and it is probable, we suppose, that he will continue to assist by his counsel in the conduct of the affairs of those companies in which he is largely interested. For many years he has been one of the busiest men in America. As President of a part of a leading trunk line he has had a prominent part in the negotiations between companies, and has, we believe, worked zealously to secure harmony in the relations of the trunk lines and the avoidance of the contests which have so nearly destroyed the value of the through traffic of his and other roads, and are probably the chief cause why the Michigan Central is no longer a dividend-paying road.

Delaware, Lackawanna & Western Change of Gauge.

The preparations being sufficiently advanced, the change of the gauge of the main line, the Utica Division, the Syracuse & Binghamton and the Oswego & Syracuse divisions was begun May 27 and successfully completed on the same day. The Richfield Branch of the Utica Division was changed on the preceding day. The change covered about 365 miles of main line, and preparations for it have been in progress for several months. On the day before, everything was put in readiness; on the main line all the trackmen from the Morris & Essex Division were collected besides those belonging there, and on the Utica and Syracuse divisions a number were borrowed from the Rome, Watertown & Ogdensburg, the Utica & Black River and other neighboring roads. A number of spare engines from the Morris & Essex Division were also sent up to the main line for use there. There was no delay in the work, and on that night standard-gauge trains ran through over the whole road.

The work of the day was to change the main track so as to permit the passage of trains, and, of course, there is still much to be done in the way of changing sidings and coal laterals, removing the third or six-foot gauge rail from the Morris & Essex and Bloomsburg divisions, etc., and in completing the change of the equipment. This, however, is all work for which a reasonable amount of time

can be allowed. The wide gauge is now practically a thing of the past, so far as this road is concerned. The supervision of the change required some very arduous and exacting work from the officers of the road, but everything was carried out as previously arranged, and no trouble was experienced anywhere.

The Erie and the Atlantic & Great Western with their branches are now the only railroads of 6-foot gauge left on the Continent, we believe. More than half of the Erie main line has a standard-gauge track also, formed by laying a third rail; and evidently the day is near at hand when there will be no 6-foot gauge in the country.

It may be noticed that by this change and the recent completion of the Lake Ontario Shore road to the Niagara River, a new route of standard gauge is completed from the Canadian roads to New York. It is possible for Great Western and Canada Southern cars to take this route instead of the New York Central, and it is not much longer than the latter, though of course at present of very much less capacity. As Mr. Sloan, the President of the Delaware, Lackawanna & Western, is reported to be the probable successor of Mr. Joy as President of the Michigan Central, it is easy for those who wish to speculate on future events to construct a new and independent through line between New York and Chicago, substantially managed by one body of proprietors, with the exception of the Great Western of Canada, which will hardly be able to refuse itself to any through line of which the Michigan Central makes a part, as it depends upon the latter for by far the larger part of its through traffic. But before a final conclusion is made as to the probability of this scheme, it will be well to bear in mind that the Michigan Central has an immense New England traffic—probably its largest through traffic; that this traffic is largely dependent upon its connection with the short Boston route formed by the New York Central and the Boston & Albany, and that it could hardly afford to make any arrangement which will jeopardize this connection and the traffic depending on it. The new line, however, will connect with the Vermont Central, and will give that a western all-rail outlet in addition to the Grand Trunk, and perhaps shorter. Another reason why it may be rash to conclude that a new through-route will be made where a new through route can be made, is the fact that it is quite questionable whether through traffic will pay on a single-track road not already prepared to handle a heavy general freight traffic.

The new route will be able to carry through to Philadelphia, as well as to New York, without changing cars.

Record of New Railroad Construction.

This number of the *Railroad Gazette* has information of the laying of track on new railroads as follows:

Camden, Gloucester & Mt. Ephraim.—Extended from Gloucester, N. J., to Mt. Ephraim, 3½ miles. It is of 3-foot gauge.
Chester & Lenoir.—Track is laid from Crowder's Creek, S. C., south to Yorkville, 14 miles, completing the road from Chester, S. C., to Gastonia, N. C., 45 miles. It is of 3-foot gauge.
Nevada County.—Extended 3½ miles to Nevada City, Cal., completing the road, which is of 3-foot gauge.
Santa Cruz.—Extended from Watsonville, Cal., to Pajaro, 3 miles, completing the road, which is of 3-foot gauge.
 This is a total of 24 miles of new railroad, making 542 miles completed in the United States in 1876, against 260 miles reported for the same period in 1875, 436 in 1874, and 918 in 1873.

THE RAIL GRAIN MOVEMENT we trace for another week, the fourth of the very low rates and the third of open navigation, by the returns of shipments from Northwestern markets. For the four weeks these shipments have been:

Week ending	By Lake.	By rail.	Total.	P. c. by rail.
April 29.....	1,634,541	2,072,946	3,707,487	56
May 6.....	2,445,191	2,292,623	4,737,814	48½
" 13.....	1,538,526	2,302,940	3,841,466	60
" 20.....	1,602,170	2,016,304	3,618,474	55½
Totals.....	7,220,428	8,684,823	15,905,251	54½

For the last of these weeks, the receipts at Atlantic ports were distributed as follows: 44½ per cent. to New York, 20 per cent. to Philadelphia, 14½ per cent. to Baltimore, 8½ per cent. to Montreal, and 8½ per cent. to Boston, 4½ per cent. to New Orleans and Portland. As compared with the three previous weeks, New York has gained a little and both Philadelphia and Baltimore lost in their proportions, the losses of the latter being about equivalent to Montreal's gains, the latter hardly being in the field at first.

The shipments from Northwestern markets continued down to May 20 much greater than their receipts, and the stock accumulated during the winter had pretty much disappeared. For the following week, however, reports from Chicago alone show that the receipts were nearly as great as the shipments, the latter having fallen off and the former increased.

THE ERIE RAILWAY now has attached to two express trains daily cars which run through to and from Philadelphia—a sleeping car and one other car on a night train, and a palace car and ordinary car on a day train. This gives it a considerable advantage for Centennial traffic. The route from Waverly is by the Lehigh Valley and North Pennsylvania railroads.

THE UNITED STATES INTERNATIONAL EXHIBITION.

II.

The first of these letters descriptive of the Exhibition was written before the opening. The ceremonies of that occasion have been fully described in the daily papers, so that little re-

mains to be said about it, excepting to dissent from some of the commendation which has been bestowed on the arrangements on that occasion. To say that a celebration was well managed in which it was necessary to call in the military to restrain a helpless crowd of good-natured people who had been kept waiting for four hours for admission to the buildings seems like a misuse of adjectives. However, that is past, and the damage done to the grounds by the crowd, which overflowed the walks, and trampled down the grass and destroyed the shrubbery, has been nearly effaced, and those whose patience and endurance was sorely tried on the opening day have recovered their equanimity, so that nothing remains now but to give attention to the Exhibition itself.

Since the first letter was written there have been great improvements in the arrangements and display. Chaos has grown much less chaotic, and empty and unpacked boxes have given place to their contents, which are carefully arranged for display. It is safe to say that the Exhibition will be in good working order when this letter reaches our readers, and persons disposed to visit it need not delay any longer on account of its undeveloped condition. Some of the outlying buildings may not be quite complete, but visitors will gain very little by waiting longer. The reports about the overcrowded condition of hotels and high prices at restaurants have been either very much exaggerated, or were only true of the opening day.

In our first letter, some account of the exhibits in the Machinery Hall was given. In this it is proposed to give a similar general enumeration of the objects pertaining to railroads in the other buildings; and in future letters, a more carefully prepared and more explicit description of the separate exhibits of manufacturers.

The railroad cars will be found in the building devoted to the carriage industries. Messrs. J. G. Brill & Co., of Philadelphia, and J. M. Jones & Co., of Troy, each have a street car on exhibition, and Messrs. John Stephenson & Co., of New York, have one two-horse and one one-horse street car. The Harlan & Hollingsworth Company exhibit a parlor car, and a narrow-gauge (3 ft.) passenger car. The Wason Manufacturing Company has sent a passenger car built for the Central Railroad of New Jersey. The Jackson & Sharpe Company are represented by a six-wheeled truck parlor car, and a three-foot gauge car named the Dom Pedro, described heretofore, which is intended for the Emperor and will be sent to Brazil. The Pullman Company has a sleeping and a drawing-room car, one of them with 42-in. wheels made of paper with steel tires. The car with these large wheels stands only about 1½ inches higher than the one adjoining with 33-inch wheels. The Pennsylvania and the New York Central railroad companies have each sent one of their fast mail cars. These stand out of doors on a track near the Government building.

It is to be regretted that there are no specimens of freight cars in the Exhibition, and that an industry of such vast proportions as our railroads have now assumed is so inadequately represented. The same thing is true of other branches of railroad industry. The writer saw but one switch—Wharton's—and no frogs or crossings, excepting those shown by the same manufacturer.

None of the railroad companies have exhibited specimens of their rail fastenings. The only signals exhibited are sent by foreigners. There is not, so far as known, a single specimen, model or drawing of water tank for supplying locomotives; not a snow plow nor a derrick car, excepting the steam cranes from England; and, in short, the Exhibition is not representative of railroad industries, excepting within very narrow limits, and in some special departments.

The exhibition of iron and steel is, however, very good. Nearly all the large iron works, and many of the minor ones, have gone to great trouble and expense to make good displays. In many cases this has been carried to an absurdly lavish and perfectly useless extent. There are, for example, specimens of rails with their whole surface filed and polished. There are exhibits of oil which, owing to the magnificent display of cut glassware, puts the spectator in doubt whether it is the contents or the vessels which are intended to be shown.

A mere enumeration of the exhibitors of iron and steel would occupy more room than can be given to it this week. In the Machinery Hall there will be a fine show of products from the celebrated works of Krupp. These are not yet all in place, but begin to assume some regular form and order.

In the Norwegian department, in the Main Building, there are specimens of bar iron, chain, railroad spikes, shot, etc., and in the adjoining Swedish department a much larger display of iron and steel. The Sandvik Iron Company have sent steel car and locomotive wheel tires, axles, ingots, bar steel, connecting rods, etc., and other manufacturers have sent boiler plate, flanged in all kinds of difficult forms, with specimens of test pieces which were broken after the holes were either punched or drilled. There are also axles, chilled cast-iron wheels, shot, frogs and turn-outs, rails, angle, T, deck and channel bars.

The American exhibits of iron and steel are also—at least the most of them—in the Main Building on the south side, and a little east of the centre. It is impossible to do more than merely enumerate these. The Adirondac Steel Company, of Jersey City, exhibits bars, ingots and forgings; the Cleveland Rolling Mill Company, axles, boiler plate, springs and steel wire; Messrs. Metcalf & Parkins, of Pittsburgh, "Crescent" bar steel, and specimens of various kinds of tools and cutlery made from the same; Messrs. W. D. Wood & Co., of Pittsburgh, sheet iron; Messrs. Brown & Co., of the Wayne Iron & Steel Company, bars and boiler plate; Messrs. Park Brothers, of the Black Diamond Steel Company, bars and boiler plate; the Lackawanna Iron & Coal Company, ores, pig and bars; the Revere Copper Company, of Boston, copper fire-box plate and yellow metal; Messrs. Lewis, Oliver & Phillips, bolts, nuts, washers and a variety of iron work; the Bay State Iron Company, of Boston, steel boiler

plates; the Chrome Steel Company, bars and tool steel; the Riverside Iron Works of Wheeling, West Va., pig iron, rails, bar iron and railroad spikes. The iron works of the Lehigh Valley have apparently united and exhibit a case containing 118 compartments, each filled with specimens of the products of that region. The Union Iron Works, of Buffalo, N. Y., exhibit rails, plates, bars, angles, T's, deck, I beams and channel bars; the Passaic Rolling Mill Company, of Paterson, N. J., show the same articles and nuts and rivets; Messrs. H. A. Beale & Co., of Parkersburg, West Va., boiler plate, bars, rails, rolled axles, fish-plates, bolts, angles and T's; Messrs. Cooper, Hewitt & Co., ores, bar iron, rails, angles, T's, channels, I beams, chains, railroad chairs and models of a Pernot puddling and steel furnaces; the Fort Pitt Iron & Steel Company, of Pittsburgh, tool steel; the Otis Iron & Steel Company, of Cleveland, Ohio, axles, steel boiler plates, ingots and test pieces; the Cambria Iron Company have a triumphal arch constructed of rails, which, it is said, is composed of three carloads of iron. The same company also exhibit specimens of ores, balls, piles and rails bent into all sorts of shapes. Messrs. Wilson, Walker & Co., of Pittsburgh, exhibit draw-bars, draw-plates, coupling links and pins; Messrs. Carnegie Brothers & Co., of Pittsburgh, show angles, T's, channel, and I beams and a model of the Lucy furnace. The Edgar Thomson Steel Company have specimens of rails and finished connecting-rods for locomotives, one of them bent double without showing signs of fracture. They also exhibit a steel rail, 62 lbs. per yard, and 120 feet long, the total weight of which is 2,480 lbs. There are also other shorter specimens of unusually long rails made at the same works. The Keystone Bridge Company has sent a beautiful model of the draw bridge over the Baritan Bay, between Perth Amboy and South Amboy, which is 472 feet long and said to be the longest in the world. The same company also show specimens of eye-bars, one of them of $9 \times 1\frac{1}{2}$ in. section, and a full-sized model of one of the joints of the steel arches in the St. Louis Bridge. They also have a fine display of photographs of bridges erected by them. Mr. F. C. Lowthorp, of Trenton, N. J., also exhibits models of parts of bridges, and photographs of completed structures which he has erected. A testing machine by Professor Thurston stood near by these exhibits, but was not yet put into working order. The Sligo Iron Company, of Pittsburgh, have sent specimens of bars and boiler plates, some of the latter being flanged in various difficult forms; Messrs. Hussey, Wells & Co., of the same place, have specimens of steel axles, boiler plate, tool steel, etc. They also show a number of specimens of difficult flanging. The Albany & Rensselaer Iron & Steel Company exhibits axles, rails, bars, fish-plate bolts, spikes, etc.; Messrs. D. Hillman & Sons, Empire Iron Works, of Trigo County, Ky., have boiler plates, ores, etc.; the Catsaugua Manufacturing Company, of Catsaugua, Pa., bar iron, rolled axles, ores, etc.; Messrs. Singer, Nimick & Co., axles, bars and boiler plate; the Shelby Iron Company, of Alabama, ores, pig iron and car wheels made from the same; the Philadelphia & Reading Railroad Company, rails, and the piles from which they are made.

A long shed adjoining and parallel to the main building contains a very large display of minerals.

Since the previous letter was written, the Baltimore & Ohio Railroad Company have sent one of their "grasshopper" engines, No. 6, and one of the passenger engines they are now building, which is numbered 600. The first is representative of the past and the latter of the present. The passenger engine is of the "Mogul" plan, with 19×24 -inch cylinders, five feet wheels, and weighs 46 tons. It stands on rails of the somewhat antiquated pattern which is still used on that road. The old engine was carefully painted and varnished before it was sent to the exhibition, which has taken away much of the venerable appearance which a relic of this kind is expected to possess. The engines are both placed by the side of the Maryland State building, which, at a national anniversary celebration of this kind, seems to be in worse taste than the painting and varnishing of an old relic.

The old engine John Bull and two contemporary passenger cars stand west of the main building, on some of the old T rail designed by Robert L. Stevens in 1830. In the machinery hall may be found the earthly remains of the Stourbridge Lion, the first locomotive engine ever run in this country. They consist of the two walking beams, four tires each $1\frac{1}{2}$ inches thick, and four rings which were attached to the wooden spokes of the driving wheels. Some suitable inscription should be placed over them, to indicate what they are, as no person, unless his attention is specially directed to them, will suspect where they came from.

Since our first review of machinery hall, many things have been added, and others which escaped the first hasty look through the building have been noticed. American mechanical engineers will be especially interested in the specimens of wrought-iron car and locomotive wheels in the French department, which are made by a process of hydraulic forging, an art almost unknown, or at least unpracticed, in this country. The largest of these wheels is seven or eight feet in diameter, but there was no one at hand who could explain the process or method of its manufacture.

In the same department are some good specimens of steam gauges and oil cups, and some wood-working machinery which is not so good.

In the Belgian department there have also been added some specimens of wrought-iron wheels, some rails for horse railroads laid on cast-iron blocks, and others laid on wrought-iron sleepers of various patterns. There is also a model of a shearing machine, and another of a steam hammer. A firm whose name we did not get exhibits specimens of fish plates, chairs, axle-boxes, bolts, nuts and spikes. There are also some fine specimens of different kinds of iron, including bar, angle, T, channel and I beams in the Belgian department in the main hall.

In the German department, in the main hall, Krupp's display

is beginning to assume some sort of order, but the progress is unaccountably slow. He now exhibits engine and car wheels, axles, etc. Messrs. Schaeffer & Budenberg, of Buckau, Magdeburg, exhibit some of their celebrated steam gauges and governors. Mr. A. Borsig, of Berlin, exhibits ores, shapes and specimens of hydraulic forgings.

In the United States department, besides those exhibits already referred to, Messrs. John Roach & Sons exhibit models of ships, iron boiler plates, and a model of a marine engine. The American Dredging Company have models of dredging machines. Messrs. Sewall, Day & Co., of Boston, have an exhibition of ropes and cordage, which we fancy would rejoice the heart of a railroad wreck-master. The New York Safety Steam Power Company show some of their small vertical engines, and also a beautiful specimen of a small steam yacht. Mr. S. L. Harrison exhibits a pair of horse-car wheels which revolve on the axle independently of each other. It would be an act of philanthropy if some one would show conclusively, so that inventors would understand it, that tight wheels are better than loose ones, even if there were no mechanical objections to the latter. The Pratt Manufacturing Company exhibit their patent lock nuts, or rather washers, and the Diamond State Iron Company show specimens of rails, fish-plates, track bolts and spikes. The Pennsylvania Steel Company has put down one of Lorenz's patent switches, and exhibit frogs, ingots and pig metal. Messrs. George K. Tryon & Co., of Philadelphia, have a beautiful assortment of brass and phosphor-bronze castings, including car journal bearings, and also Babbitt and composition metal. The Naahua (N. H.) Iron Company's exhibit consists of steel forgings, axles and car and locomotive tires. Near to these is one of Woodbury's patent elastic (?) car wheels. Messrs. F. W. McClary, of the Delaware Locomotive & Car Spring Works, of Wilmington, and Messrs. James Jeffries & Sons, of Philadelphia, both exhibit an assortment of spiral and elliptic car and engine springs. The Columbia Car Spring Co., of New York, and the Culmer Spring Company, of Pittsburgh, have each sent an assortment of spiral springs. The Standard Steel Company exhibits steel blooms, forgings and tires in every condition of manufacture. The National Tube Works, of Boston and of McKeesport, Pa., have a handsomely arranged assortment of wrought-iron tubes of various sizes, and of the fixtures of various kinds used with them. Messrs. Bronson, Matthews & Co., of Toledo, Ohio, exhibit one of Armstrong's feed-water heaters, and the Stillwell & Bierce Manufacturing Co., of Dayton, Ohio, one of their feed-water heaters and lime extractors. Mr. Thomas Shaw, of Philadelphia, has an improved locomotive exhaust nozzle, or blast pipe. This, instead of having one aperture, consists of a number of small pipes. He also shows a mercury column test gauge, and specimens of turning tools. The Hartford Steam Boiler Inspection & Insurance Company has on exhibition specimens of parts of ruptured boilers, and of boiler scale, and photographs of exploded boilers. The Utica Steam Gauge Company has specimens of their gauges; and E. H. Ashcroft, steam and water gauges, ratchets, stocks and dies, and a patent furnace door for steam boilers. The Cleveland Steam Gauge Company also exhibits specimens of steam gauges. Geo. V. Cresson, of Philadelphia, has a stand with specimens of pulleys, hangers, etc., the same that was exhibited two years ago at the Franklin Institute. Messrs. Jones & Laughlin, of Pittsburgh, have an assortment of various kinds of cold-rolled shafting, pulleys hangers, fish-plates, bars, rails, etc.; Messrs. William Bailey, Lang & Co., a specimen of Cammell's steel locomotive tire rolled in Jersey City; Messrs. Fisher & Norris, anvils and one of Clark Fisher's patent rail joints; Messrs. H. B. Manning & Co., of New York, agents for the Morse Twist Drill and Machine Company, a beautiful case of taps, dies, reamers, twist drills, cutters, etc. The Brown & Sharpe Manufacturing Company, of Providence, R. I., exhibit a large assortment of special machine tools; Messrs. W. C. Allison & Co., specimens of wrought-iron pipe, iron work, photographs of cars, etc.; and Messrs. Hoopes & Townsend, of Philadelphia, have a sort of temple or grotto of bolts, nuts, washers, etc., etc.

There are other exhibits which doubtless have been overlooked, but which we hope in future to describe. Visitors to the Exhibition will find an examination of it to be about as tiresome work as they have ever undertaken. The members of the Master Mechanics' Association, who as a class are not a feeble folk, came to the hotel each evening more used up than they would have been after running a locomotive twelve hours, and all over the grounds may be seen daily persons almost completely exhausted by their efforts to get their money's worth; or, as a fresh-looking young woman expressed it within hearing in the Main Hall, as she dropped wilted into a seat: "Oh! I am so tired I just can hardly move." The best plan to see the Exhibition is first to take a hasty survey of the whole ground, then determine what a visitor wants to see most, and then take the articles in the order of their importance. Unless some weeks are devoted to the work, there will still be more to see than there will be time or strength to examine carefully.

Judges at the World's Fair.

The following are the judges in the groups most interesting to railroad men. Those named first in each group are the American judges:

Minerals, Metallurgy and Machinery.—Alexander L. Holley, No. 56 Broadway, New York; Prof. T. Sterry Hunt, LL. D., F. R. S., St. James Hotel, Boston, Mass.; Prof. J. M. Safford, Tennessee; S. B. Axtell, Santa Fe, New Mexico; John Fritz, Bethlehem, Pa.; Austin Savage, Boise City, Idaho; W. S. Keyes, Picoche, Nev.; Prof. Frederick Prime, Jr., Easton, Pa.; Matthew Addy, Cincinnati, O.; Prof. G. C. Broadhead, Pleasant Hill, Mo. Foreign Judges: Isaac Lowthian Bell, M. P., C. E., Great Britain; Mr. Althaus, Germany; Mr. Simonin and Mr. Walton, France; A. R. Akerman, Sweden; A. Jattrand, Belgium; Mr. Michailofski and Nicholas Tossa, Russia; Dr. Th. Kjermuit, Norway; Don Daniel Cartazan, Spain; Emanuel Paterno, Italy.

Glassware, Artificial Stone, &c.—Gen. Q. A. Gillmore, United States Army, care D. Van Nostrand, New York; Arthur Beckwith, No. 134 Fifth Avenue, New York; Prof. E. T. Cox, Indianapolis, Ind.; Hector Tyndale, Philadelphia; Henry Wurtz, Hoboken. Foreign Judges: H. H. Soden Smith, Great Britain; Dr. G. Seelhorst, Germany; M. de Buey, France; Adolf E. Nordenskiöld, Sweden; Mr. Notomi, Japan.

Chemistry and Pharmacy, with the Apparatus.—Prof. C. A. Joy, New York; Prof. F. A. Genth, University of Pennsylvania, Philadelphia; Prof. J. Lawrence Smith, Louisville, Ky.; Prof. C. F. Chandler, New York; Prof. J. W. Mallet, University of Virginia; Charlottesville, Va. Foreign Judges: Dr. Odling, F. R. S., Great Britain; Dr. R. von Wagner, Germany; M. Kulman (file), France; Dr. Dewilde, Belgium.

Timber, Worked Lumber, Parts of Buildings.—Prof. William H. Brewer, New Haven, Conn.; J. M. Bennett, Weston, Lewis Co., West Va.; Prof. J. S. Newberry, Cleveland, O., or Columbia College, New York. Foreign Judge: John R. West, Chili.

Builders' Hardware, Tools, Cutlery, &c.—Charles Staples, Portland, Me.; Daniel Steinmetz, Philadelphia; George B. Reed, Clearfield, Pa.; Gen. J. D. Imboden, Richmond, Va. Foreign Judges: The Hon. J. Brian, Mr. D. MacHardy, Great Britain; Mr. Diefenbach, Germany.

Railway Plant, Rolling Stock, Engines, &c.—R. E. Ricker, Elizabeth, N. J.; Gen. T. A. Morris, Indianapolis, Ind.; Felician Slataper, Pittsburgh, Pa. Foreign Judges: Capt. Douglass Galton, R. E., C. B., F. R. S., Great Britain; Mr. Ernst Pontzen, Austria; Mr. E. A. Schaer, Belgium.

Vessels and Apparatus of Transportation.—Isaac Newton, New York; J. W. Griffith, Portsmouth, N. H.

Motors, Hydraulic and Pneumatic Apparatus.—C. F. Porter, Newark, N. J.; Joseph Belknap, New York; James Moore, Philadelphia; Horatio Allen, South Orange, "Homewood," N. J.; Charles E. Emery, No. 7 Warren street, New York. Foreign Judges: Mr. W. H. Barlow, Great Britain; Mr. Reuleaux, Germany; Nicholas Petroff, Russia; Emile Brugach, Egypt.

Machine Tools for Wood, Metal and Stone.—Irving M. Scott, San Francisco, Cal.; G. H. Blelock, Springfield, Mass.; W. F. Durfee, Wisconsin (at No. 56 Broadway, New York); Prof. John A. Anderson, President Kansas State Agricultural College, Manhattan, Kansas. Foreign Judges: Mr. John Anderson, LL. D., C. E., Great Britain; M. le Commandant Perier, France; Mr. C. A. Angstrom, Sweden; Mr. August Gobert, Belgium; Mr. Felix Reifer, Austria.

Instruments of Precision, Research, &c.—Prof. Joseph Henry, LL. D., Secretary of Smithsonian Institute, Washington, D. C.; Prof. F. A. P. Barnard, S. T. D., Columbia College, New York; Prof. J. E. Hilgard, Washington, D. C.; Prof. J. C. Watson, Ann Arbor, Mich.; H. K. Oliver, Salem, Mass.; George F. Bristow, New York. Foreign Judges: Sir William Thompson, LL. D., D. C. L., F. R. S., Great Britain; Julius Schiedmayer, Germany; M. Levasseur, France; P. K. Kupka, Austria.

Architecture and Engineering.—James B. Eads, C. E., South Pass Jetty Works, No. 122 Common street, New Orleans, La.; Gen. William B. Franklin, Hartford, Conn.; Richard M. Hunt, Newport, R. I. Foreign Judges: Sir John Hawkshaw, C. E., F. R. S., Great Britain; M. Lavenne, France; J. M. da Silva Coutinho, Brazil; F. G. W. Fynje, Netherlands.

The American judges in the group of Mining, Metallurgy, etc., will be recognized as among the most eminent engineers in these specialties. Of the foreign judges, Mr. Isaac Lowthian Bell is perhaps the most eminent of English iron masters, and especially familiar with our iron mines and manufactures by his visit of several months made last year, concerning which he made an admirable report to the British Iron and Steel Institute, of which he was President. Mr. L. Simonin is a great traveller, who has seen and written about the most important mines of precious metals, the great public works, and the cities of North and South America. He has recently published a book on his observations in the United States, in which is a long chapter on our railroads. His papers have doubtless been widely read in Europe, as they were published in the great French review—which is also the great review of the world—*La Revue des deux Mondes*. Monsieur Simonin will be sure to make notes of what he sees and print them. Mr. Michailofski has been in this country already about a year, studying our harbors and water communications for the Russian Government. Unfortunately, we understand, he can only remain till June.

Of the judges of "Railway Plant, Rolling Stock, Engines, etc." (are not locomotives rolling stock?), Mr. Ricker is the Superintendent of the Central Railroad of New Jersey, and was formerly a Master Mechanic on the Pennsylvania Railroad. General Morris, of Indianapolis, is an old railroad officer. Mr. Slataper, of Pittsburgh, is Chief Engineer of the Pittsburgh, Fort Wayne & Chicago Railway. Captain Galton, the British judge, is eminent in his profession, and officer of the Royal Engineers, and an author as well as an engineer. Mr. Pontzen, the Austrian judge, has visited this country before and written favorably of our bridges, as our readers know, and his opinions have weight at home. Mr. W. H. Barlow, of the judges on "Motors," etc., Sir William Thompson, of those on "Instruments of Precision," and Sir John Hawkshaw, Past President of the Institute of Civil Engineers, of the judges on "Architecture and Engineering" have an international as well as a national reputation.

General Railroad News.

TRAFFIC AND EARNINGS.

Coal Movement.

Coal tonnages for the week ending May 20 are reported as follows:

	1876.	1875.	Inc. or Dec.	P. C.
Anthracite	394,998	289,271	Inc. 112,724	39.9
Semi-bituminous, Broad Top	3,100	.....	.....	.....
" Clearfield	21,343	8,076	Inc. 13,267	164.3
" Cumberland	43,928	61,608	Dec. 18,675	30.3
Bituminous, Barclay	6,727	.....	.....	.....
" Allegheny Region	4,896	.....	.....	.....
" Western Pa.	29,475	30,496	Inc. 3,855	13.6

The Anthracite Board of Control has resolved to suspend production each alternate week from June 1 to August 1. It was resolved at the same time to continue May prices through June, to increase 10 cents a ton July 1, and 15 cents August 1.

Through Passenger Rates.

The New York Central & Hudson River Company last Sunday announced the following passenger rates, to take effect May 29: New York to Chicago, \$17; to Cincinnati, \$15; to Detroit, \$13; to Indianapolis, \$16; to Louisville, \$19; to St. Louis, \$23. The next day the Erie announced rates a dollar lower, and these have prevailed by all routes, beginning with Monday. The fare from Boston to Chicago is now \$18, with corresponding rates

to other points, while the Grand Trunk charges but \$14. It is said that this reduction is made for the reason that the Grand Trunk, while nominally maintaining rates, has been selling second-class tickets with the understanding that the holder shall have first-class passage, but there were also charges that New York rates were not properly maintained.

Railroad Earnings.

Earnings for various periods have been reported as follows:

Year ending March 31:	1875-76.	1874-75.	Inc. or Dec.	P. c.
Boston, Concord & Montreal	\$693,855	\$664,194	Inc. \$29,661	4.4
Expenses	511,343	523,986	Dec. 12,643	2.4
Net earnings	\$182,512	\$140,208	Inc. 42,304	29.8
Earnings per mile	4.333	4.191	Dec. 0.142	3.4
Per cent. of expenses	73.75	78.89	Dec. 5.14	6.5
Chester & Lenoir	17,148	.....	.....	.....
Expenses	10,159	.....	.....	.....
Net earnings	\$6,989	.....	.....	.....
Earnings per mile	7.79	.....	.....	.....
Per cent. of expenses	59.76	.....	.....	.....
Manchester & Lawrence	179,246	\$183,646	Dec. \$4,400	2.4
Expenses	78,560	82,528	Dec. 3,968	4.8
Net earnings	\$100,686	\$101,118	Dec. \$432	0.4
Earnings per mile	6.894	7.063	Dec. 0.169	2.4
Per cent. of expenses	43.82	44.94	Dec. 1.12	7.5
Northern (New Hampshire)	509,985	.....	.....	.....
Expenses	408,738	.....	.....	.....
Net earnings	\$95,250	.....	.....	.....
Earnings per mile	6.073	.....	.....	.....
Per cent. of expenses	81.10	.....	.....	.....

Six months ending March 31:

Boston & Lowell	\$736,357	\$783,976	Dec. \$47,619	6.1
Expenses	533,581	731,913	Dec. 198,332	27.1
Net earnings	\$202,776	\$52,063	Inc. \$150,713	289.5
Earnings per mile	8.872	2.245	Dec. 6.627	6.1
Per cent. of expenses	72.46	93.36	Dec. 20.90	22.4

Four months ending April 30:

Cleveland, Mt. Vernon & Del	\$117,093	\$124,938	Dec. \$7,845	5.8
Mobile & Ohio	669,637	692,865	Inc. 23,228	12.9
Paducah & Memphis	76,740	62,867	Inc. 13,873	22.1

Month of March:

Denver & Rio Grande	\$31,072	\$26,500	Inc. \$4,572	19.5
Expenses	17,070	15,934	Inc. 1,136	7.1
Net earnings	\$14,002	\$10,566	Inc. \$3,436	38.2
Per cent. of expenses	63.90	60.13	Dec. 3.77	1.0

Month of April:

Atlantic & Great Western	\$301,702	\$337,964	Dec. \$36,262	10.7
Cleveland, Mt. Vernon & Del	30,217	36,427	Dec. 6,210	17.1
Mobile & Ohio	105,685	109,711	Dec. 4,026	3.7
Paducah & Memphis	16,975	15,746	Inc. 1,229	7.8

Second week in May:

Atchison, Topeka & S. F.	\$54,438	\$29,168	Inc. \$25,270	86.5
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Third week in May:

Chicago & Alton	\$103,190	\$89,436	Inc. \$13,754	15.4
Michigan Central	128,519	119,807	Inc. 8,712	7.3
Missouri, Kansas & Texas	49,858	43,716	Inc. 6,142	14.1

Week ending May 12:

Great Western, of Canada	\$10,233	\$10,201	Inc. \$32	0.2
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Week ending May 13:

Grand Trunk	\$24,500	\$26,100	Dec. \$1,600	4.4
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Grain Movement.

For the week ending May 20 the movement of grain of all kinds was, in bushels:

	1876.	1875.	Increase.	P. c.
Lake ports' receipts	2,615,020	2,280,422	334,598	14.7
" " shipments	3,618,474	2,416,771	1,201,703	49.7
Atlantic ports' receipts	3,941,661	1,891,558	2,050,103	108.4

The proportion shipped by rail was 55% per cent. this year, against 35% per cent. in 1875 and 22 per cent. in 1874.

Chicago receipts and shipments for the week ending May 27 were:

	1876.	1875.	Increase.	P. c.
Receipts	1,555,278	1,392,950	162,328	11.6
Shipments	1,731,641	1,487,801	243,840	16.4

Compared with the previous weeks, the figures are:

	Week ending May 27.	May 20.	May 13.
Receipts	1,555,278	1,213,930	989,758
Shipments	1,731,641	1,887,350	2,281,214

The decrease in shipments is marked. They were less by 24 per cent. than two weeks before; but receipts have increased about as much as shipments have fallen off, and were not much less than the shipments for the last week.

OLD AND NEW ROADS.

Auction Sales of Railroad Securities.

At executors' sale in Nashua, N. H., May 18, Concord Railroad stock brought 80% to 82%; Northern (N. H.) stock, 62; Fitchburg Railroad stock, 122% to 124%.

Erie.

The following order has been issued by the Receiver, dated May 27: "In view of the condition of the business of the company, the following reduction in the rate of compensation is made necessary, and will take effect on and after the 1st proximo. In all cases where the rate of compensation is \$10,000 and upwards, per annum, a reduction of 20 per cent.; over \$5,000 and under \$10,000, 15 per cent.; over \$1,000 and under \$5,000, 10 per cent. This order applies to all the general officers, the Superintendent of Transportation and his assistant, the division superintendents, the Superintendent of Motive Power, the station agents, and to the entire clerical force of the company."

Boston, Clinton & Fitchburg.

The stockholders of this company at a special meeting held May 29 voted by a large majority to confirm and ratify the agreement of consolidation with the New Bedford Company. The stockholders of the New Bedford Company met the same day and also voted to ratify the agreement. The terms of the consolidation were given in the *Railroad Gazette*, on page 234 of the current volume. The stockholders will have a month, from June 1 to July 1, to decide in what manner they will make the exchange of old for new stock.

Portsmouth & Dover.

At the adjourned special meeting, held May 29, the committee appointed at the previous meeting reported that the company had no legal power to raise the money needed to pay off the floating debt. It was voted that an application be made to the Legislature to authorize the cities of Portsmouth and Portsmouth (which own nearly all the stock) to raise the money or provide for the debt.

The Pacific Railroads and the Government.

Mr. C. P. Huntington, Vice-President of the Central Pacific Railroad Company, has written a letter to the Chairman of the House Committee on the Judiciary, in which he says the company recognize as fully as the committee the desirability, both to the Government and the company, of an equitable and final settlement of all matters and questions of whatever kind between them.

If it should be determined by the committee to insist upon

the cash payments named by one of the committee, the company would prefer the contract as it is, leaving the question at issue to be settled in the future on equitable terms. The contraction in values, he says, largely exceeded the calculation of the company, and the amount received from the sales of lands has not been as large as was expected. The road was built in times of high prices, and, although economically constructed, cost a very large sum of money, and he raises the question whether the nation (it being the principal beneficiary) should not share in the shrinkage, the saving to the Government every year being more than the annual interest it pays on the bonds of the company.

He compares the cost of transportation to the Government before and after the opening of the road, and shows that the Government is now sending a large portion of its freights to the Pacific Coast by water and not by rail, as was contemplated. He offers to give any information the committee may desire in regard to the suggestions of his letter, as the company is anxious to settle the matter, so as to avoid continual misunderstanding with regard to the true interpretation of the contract.

New Orleans, Mobile & Texas.

In the case wherein Mr. Charles Morgan sues to have the contract of Dec. 12, 1871, made void on account of the failure of the company to perform its share, the United States Circuit Court decides that the contract was made in New York and must be governed by the laws of that State. Those laws do not provide for the voiding of a contract on account of the non-performance of a part of its conditions, and the relief asked for cannot be granted.

The contract sued on was one by which Mr. Morgan withdrew his steamboat line between New Orleans and Mobile, which had been run in opposition to the railroad, and sold the boats to the company, taking at the same time a large amount of the company's securities and transferring to it the control of the Pontchartrain Railroad.

Tennessee & Pacific.

At the sale of the interest of the State of Tennessee in this road, the company having failed to make the final payments, the road was bought in by President Maney for account of the company. The board subsequently ratified the purchase and ordered the necessary payment to be made. The purchase money is payable in State bonds and overdue coupons.

Chester & Lenoir.

The work of laying track southward from Gastonia, on the Atlanta & Richmond Air Line, is now completed to Yorkville, S. C., where connection is made with the older portion of the road, from Chester to Yorkville. The road is now about 45 miles long, from Chester to Gastonia, and trains have begun to run through. Next week the work of tracklaying will be resumed, from Gastonia northward towards Lenoir.

At a recent meeting of the stockholders it was resolved to order a survey of a new line between Lincoln and Hickory, N. C., and to have estimates made to compare the cost of this new line with that through Newton. It is said that more local subscriptions can be secured on the new line than on the Newton line, though there will be little difference in the length of the two.

The people of Lincoln offer to raise enough to buy the iron from that place to Dallas, about 14 miles. The Dallas people have subscribed for \$10,000 bonds of the company, and \$7,000 of the Chester County bonds have recently been sold.

Blue Ridge.

The adjourned convention in aid of this road met in Charleston, S. C., May 25, and remained in session two days, a large number of delegates being present from South Carolina, North Carolina and Tennessee. The committee appointed at Knoxville and continued at the Anderson convention reported that there were no difficulties in the way of consolidating the Tennessee, Georgia and North Carolina sections of the road, but that the South Carolina Company was still involved in litigation, and nothing could be done until that was settled. Reports were received on the country to be served by the road and its prospective traffic, and speeches were made, but nothing new was brought forward. The convention appointed a committee to call another convention hereafter, and another committee to prepare a memorial to Congress asking for aid to the road.

New Haven & Northampton.

In the Plantville depot case this company has given notice of appeal from the Connecticut Court to the Supreme Court of the United States. Meantime, it refuses to stop its trains at Plantville, claiming that the writ of *mandamus* ordering it to do so was not served until after the appeal was taken.

Atchison, Topeka & Santa Fe.

The County Commissioners of Atchison County, Kan., have brought suit to recover \$150,000 in county bonds which were issued in exchange for an equal amount of stock in this company, which stock was subsequently given to the company on certain conditions. The ground of the suit appears to be that the different contracts with the company were made without sufficient authority and are therefore void.

Texas Western.

Arrangements have been made to resume work on this road and to complete a section of 30 miles, which will carry the road to a point about 40 miles west from Houston, Tex.

Western Counties.

Messrs. Shanly & Plunkett, contractors for this road, ask for proposals for about 30 miles of track laying, commencing at a point about 18 miles north of Yarmouth, and ending at Sissiboo River, Weymouth, N. S. Tenders will also be received for ditching, cleaning, cuttings, widening banks, etc., on the first ten miles of the above mentioned 30 miles.

Specifications and forms of tender, will be forwarded on application. Proposals will be received until June 15, at the contractors' office, Weymouth, Nova Scotia.

Joliet & Northern Indiana.

The *Boston Advertiser* says: "The case of the Joliet & Northern Indiana bondholders against the Michigan Railroad has recently been decided in their favor in the Circuit Court of the United States, on appeal from the District Court, in which the bondholders made their first success. The case is further appealed by the Michigan Central, and therefore goes to the Supreme Court of the United States."

South Mountain.

This unfinished road is advertised to be sold June 17 by the Sheriff of Lebanon County, Pa.

Dividends.

Dividends have been declared by the following companies: Iowa Falls & Sioux City (leased to Illinois Central), 1% per cent., quarterly, payable June 1.

Lehigh Coal & Navigation, 2 per cent., quarterly, payable June 3.

Pacific, of Missouri.

The Missouri State Board of Equalization has fixed the valuation of this property as follows: Road-bed per mile, \$12,350; locomotives, each \$6,500; passenger cars, \$3,000; baggage cars, \$1,000; combination cars, \$400; open and stock cars, \$350; flat and coal cars, \$250; postal cars, \$1,200; cabooses, \$500; pay-cars, \$200; hand-cars, \$40; directors' car, \$5,000; Pullman cars, \$9,500. Total valuation per mile exclusive of lands and build-

ings, \$16,500. The board of 1875 assessed at \$19,319 per mile, and also fixed the road-bed at \$1,500 a mile. The Carondelet Branch was assessed at \$7,000 per mile, Osage Valley Branch at \$4,000, and St. Louis & Lexington at \$5,000.

Chippewa Falls & Western.

This company has made an issue of \$150,000 first-mortgage bonds, being at the rate of \$12,500 per mile of finished road. It is said that arrangements have been made for the sale of the bonds at 85.

Selma, Marion & Memphis.

Suit has been begun in the Alabama Chancery Court to set aside the consolidation of the Tennessee, Mississippi and Alabama companies out of which the present company was formed; also to set aside the issue of \$301,000 bonds made March 17, 1871, and the subsequent issue of consolidated bonds.

Chicago & Pacific.

In Chicago, May 27, application was made to the United States Circuit Court for an injunction against the company and the appointment of a receiver by the Lackawanna Iron & Coal Company, which holds notes to the amount of \$337,764 given for rails; the Delaware, Lackawanna & Western Company, which has \$30,376 of notes given for rail fastenings; the National City Bank, of New York, holding notes for \$41,333; Moses Taylor, notes for \$51,667, and John I. Blair, notes for \$51,667, the three last named being for loans and advances made. These notes were all secured by deposit of first-mortgage bonds, \$1,237,000 in all, upon which no interest has been paid. The petition sets forth that the notes are long overdue; the bonds have no value and cannot be sold, and there is no trustee under the mortgage, the New York State Loan & Trust Company, which was trustee, having been dissolved. The road is in bad condition, the employees unpaid and the company insolvent, having a floating debt of \$200,000. Judgments to the amount of \$65,000 have recently been obtained, under which the equipment has been seized by the Sheriff.

The Court granted the injunction and appointed James M. Whitman Receiver.

President Dobbins and several other officers of the company were arrested in Chicago the same day on charges made by a man who had sold supplies to the road. They were released on their own agreement to appear in court.

Pacific Mail.

The earnings of the steamship lines of this company for the year ending April 30, are reported as follows:

	1875-76.	1874-75.	Inc. or Dec.	P. c.
Gross earnings	\$5,500,013 69	\$6,425,050 78	Dec. \$925,037 09	14.4
Expenses	4,915,917 95	6,978,689 17	Dec. 2,062,771 22	29.6

Net earnings or deficit..... \$584,095 74 \$553,038 39 10.23 17.7

Per cent. of expenses..... 89.38 108.61 Dec. 19.23 17.7

The great decrease in expenses thus more than balanced the falling off in earnings, producing a rather favorable result.

Pennsylvania & Sodus Bay.

The foreclosure sale of this road is to take place at Trumansburg, N. Y., June 3. The road was intended to run from Waverley, N. Y., to Lake Ontario at Sodus Bay, and some 60 miles of it were graded in 1872, but no iron was ever laid. It is said that the Lehigh Valley Company is desirous of purchasing it and that some New York parties who hold a large amount of the bonds are also prepared to bid.

Illinois Railroad Law.

In the suit against the Toledo, Wabash & Western Company for violation of the railroad law, the Illinois Circuit Court has refused to allow depositions as to the cost of construction and working of the road to be put in as evidence in support of the reasonable nature of the rates charged.

Memphis, El Paso & Pacific.

The *Bulletin de New York* of May 29 says: "Mr. John A. C. Gray, Receiver of this company, has just returned from Texas. During his stay in that State he has made all the arrangements necessary for the delivery of the titles in conformance with the contract of June 12, 1873. A transfer of 1,000 certificates has been placed in the hands of the Land Commissioner. The Receiver has been able to give an account of the slow manner in which business is transacted in the Land Department, and he thinks that if the work was left to the ordinary routine of the administration, it would be necessary to wait for a long time yet before obtaining these titles. Desirous of terminating the business, Mr. John A. C. Gray has promised him that the certificates will be ready by July 15. The exchange of the land grant bonds for these land certificates will take place at that time."

Meetings.

The following companies will hold their annual meetings at the times and places given:

Pennsylvania Company, at the office in Pittsburgh, Pa., June 6, at 11 a. m.

Michigan Central, at the office in Detroit, Mich., June 23.

Ulster & Delaware, at the office in Rondout, N. Y., June 14, at 1 p. m.

Chicago, Milwaukee & St. Paul, at the office in Milwaukee, June 5, at noon.

Columbus, Chicago & Indiana Central, at the office in Columbus, O., June 7, at 11 a. m.

New York Central & Hudson River, at the office in Albany, N. Y., June 7, at noon.

Keokuk, Iowa City & Minnesota.

The President of this company has prepared a report setting forth its present condition. There has been collected from stock subscriptions and expended on the road \$259,010.60. The company's debt consists of \$36,634.25 judgments obtained by various parties, about \$3,000 in small claims for labor, etc., and some \$50,000 claimed by the Construction Company, whose account has not been audited. There are many stock subscriptions unpaid, of which it is believed that \$121,700 can be collected. The first mortgage bonds were executed and sent to London to be negotiated. They are now held there as security for expenses incurred and advances made by the bankers, amounting to about \$6,000. Negotiations are now going on for a settlement of these claims and a return of the bonds.

Chicago, Burlington & Quincy.

Notice is given that, under the contract between the two companies, \$107,196.99 have become available for the purchase of Carthage and Burlington bonds, besides the sum of \$228,000 for which proposals have heretofore been invited. Proposals are therefore invited for the sale to the company of bonds to the whole or any part of this amount. Such proposals should be sent to John N. Denison, Assistant Treasurer, at Boston, by June 6.

Atlantic, Mississippi & Ohio.

Recently in the *Baltimore Gazette* and a number of other papers letters have appeared making serious charges against the present management and urging that the receivership be given to some one not now connected with the company. The charges made are wasteful and extravagant management, bad faith with the bondholders and the expenditure of large amounts in maintaining newspapers and for purposes connected with the local poli-

ties of Virginia. The simultaneous appearance of these letters, coming evidently from the same party, and other facts connected with them, indicate an organized attack on General Mahone, the purpose of which is not quite clear.

North Pacific Coast.

The tunnel near Tomales, Cal., is completed, and the contractor has moved his camp to Valley Ford. The grading is about completed to Freestone, 10 miles north of Tomales, and track is to be laid to that point at once.

Lake Superior & Mississippi.

It is stated that holders of \$3,750,000 out of the \$4,500,000 first-mortgage bonds have assented to the proposed plan of re-organization, and others are coming in daily.

New Orleans, St. Louis & Chicago.

The Receiver has arranged to apply the entire net earnings of the road for the present to bringing the road-bed and track into good condition. A large amount of new iron has been distributed along the line and will be laid as fast as possible.

Brownville & Sebec.

The incorporators of this company met in Bangor, Me., May 24, voted to accept the charter, and organized the company by electing directors.

Manchester & Lawrence.

At the annual meeting in Manchester, N. H., May 26, resolutions were adopted authorizing the directors to submit all matters in controversy arising from the contract with the Concord Railroad Company to a board of referees to be mutually agreed upon.

Dutchess & Columbia.

A meeting of the first-mortgage bondholders is to be held in Newburg, N. Y., June 5, to take some action with reference to the foreclosure sale, which is to take place June 8.

Miami Valley.

The directors met in Lebanon, O., May 25, and adopted the final location of the road between Cincinnati and Wayneville. A committee was appointed to negotiate with the Cincinnati, Batavia & Williamsburg Company as to a common entrance into Cincinnati.

Chicago, Danville & Vincennes.

Receiver Anderson reports for March and April as follows:

Balance on hand March 1.....	\$39,170 55
Receipts on freight account.....	199,377 23
" " passenger.....	17,904 38
" " other transportation accounts.....	19,219 88
" " miscellaneous accounts.....	2,067 38
Total.....	\$187,749 43
Disbursements for pay-rolls, supplies, rents, working expenses, etc.....	176,127 39
Balance, April 30.....	\$11,622 04

The accounts were referred by the Court to a master for examination and report.

The United States Circuit Court has extended until June 10 the time for taking testimony before the master in the foreclosure suit.

National.

The late Maryland Legislature passed a law chartering a company by this name, the object of the company being "to connect Washington with the Pennsylvania system of railroads, through or near Brookville, by the most feasible and direct railroad communication practicable."

Commissioners to open books of subscription are named and the capital stock fixed at \$2,000,000. Among the commissioners are A. R. Shepherd, A. G. Riddle and F. P. Stanton, of Washington; Montgomery Blair, Washington Bowie, Denis Gaither and John K. Longwell, of Maryland.

Grand Trunk.

The Detroit Tribune says of the proposed removal of this company's shops from Port Huron to Detroit Junction: "The company's shops were originally built on the Military Reservation at Port Gratiot under an act of Congress, which provided that all buildings erected must be fire proof. The company did not propose to erect strictly fire-proof buildings, and the military commander, acting upon the restriction of the law, refused to allow any other. Mr. Hickson, the general manager of the Grand Trunk road, at once took steps looking to the removal of the shops to the Detroit Junction. As the company employ about 400 men, the majority of whom make Port Huron their abiding place, the citizens have taken steps to prevent, if possible, the proposed removal, by obtaining an amendment to the law that will secure to the company the rights and privileges they may require, as the road do not desire to remove the shops. The matter will probably be delayed until such legislation as may be required to amend the law can be effected."

Green Bay & Minnesota.

It is said that the proposed branch from Plover, Wis., to Stevens Point will probably be built this season. It will be about four miles long.

Railway Passenger Conductors' Life Insurance Association.

The fifth annual convention was held in Philadelphia, May 24. The association now has 926 members of the first and 463 of the second series. The Secretary's report showed that there had been but fifteen deaths during the year ending March 1, 1876, and only four from railroad accidents. The collections for the year amounted to \$38,638 and the expenditure to \$31,384, of which \$25,178 were paid to the widows of deceased members. The board of directors announced that they intended to push the suit against their defaulting Treasurer, T. Sprole Leisenring, and stated that his bondsmen were good for the amount of deficiency. The convention adjourned to meet in Philadelphia again in May, 1877.

New York, Boston & Montreal.

The forced sale of the New York & Boston Division has again been postponed, this time from May 25 to June 5.

Connecticut Central.

Work on the grading of the Rockville Branch is progressing briskly, and the contractors expect to have it completed by September. It is about seven miles long.

Boston, Lawrence & Haverhill.

The stock subscription books have been closed, the entire amount of stock, \$150,000, having been subscribed. Arrangements are being made to begin work at once.

Railroad Taxation in Missouri.

The Missouri State Board of Equalization, now in session at Jefferson City, has been for some time past busily engaged in fixing the valuation of the railroads of the State for taxation. A great deal of testimony has been taken, much of it conflicting and contradictory.

San Francisco & North Pacific.

A new company by this name has filed articles of incorporation in California. The capital stock is fixed at \$14,350,000, and the incorporators are all Central Pacific men. The line as fixed by the articles filed is as follows: Commencing at a point in San Francisco, through the city and county of San Francisco, by Sausalito, in Marin, through Sonoma, Mendocino, and Hum-

boldt counties, to a point in Humboldt Bay, about 203 miles from San Francisco; also a branch from San Francisco through Yubum Point, in Marin County, to the main line, about ten miles; also a branch commencing near San Rafael, and running through Sonoma and Napa counties, and into Bolano, to the California Pacific Railroad at or near Jamison's Pass; also a branch from Napa City to intersect the branch last aforesaid. The aggregate length will be about 250 miles.

There is already a road by this name occupying the southern part of the proposed line. It is not stated whether the new company is to take in the existing road, which was for a time under the control of the Central Pacific people, or to build an entirely new road; probably the former.

Delaware & Bound Brook.

Ground has been broken for the short branch which is to connect Trenton, N. J., with this road, and a considerable force is at work on the grading.

Atlantic & Pacific.

The receivers announce that the July coupons will not be paid on the \$7,188,500 bonds issued under the mortgage of July 1, 1868, and known as the South Pacific first-mortgage bonds. Interest has been paid heretofore on these bonds.

Henderson & Overton.

This road has been transferred, with all the work heretofore done upon it, to Mr. Webster Flanagan, who agrees to have it completed by Oct. 1. It is to be about 14 miles long, from Henderson, Tex., northwest to the International & Great Northern at Overton.

Southern Railroads and the Government.

A bill introduced in Congress by Mr. Hartridge, of Georgia, proposes to modify the act of March 3, 1871, providing for a settlement of the balances due the Government from Southern railroad companies, as follows:

"That in making said re-adjustment, such abatement shall be allowed, respectively, as shall be deemed just in respect of an over-valuation, if any, of the property sold to said railroad companies, not exceeding 25 per centum of the valuation of the property in each case, as made under the authority of the War Department on the occasion of such sales: *Provided*, That such settlement shall be made within one year next after the passage of this act.

"That in such re-adjustment and settlement, no allowance shall be made in respect of any matter occurring prior to such sales and transfers, nor otherwise, except such payments as may have been made in cash, and such credits for transportation as the general course of business regulations of the Department authorize; that when any abatement is made in pursuance of this act the Secretary of War be and is hereby authorized to issue his warrant on the Treasury of the United States to the President, or other lawful agent, or his order, of each company entitled for the amount of money found to be due."

Somerset.

The people of the towns interested have offered to bear the expense of the survey of the extension of this road northward, between Carratunk Falls and Bingham village, about 10 miles.

Bedford, Brownstown & Madison.

This company has filed articles of incorporation in Indiana, and purposes building a railroad from Bedford, Ind., east to Brownstown and thence east by south to the Ohio River at Madison, about 65 miles. The capital stock is to be \$1,000,000.

Nashua & Rochester.

This company was authorized by the last New Hampshire Legislature to issue 2,000 shares new stock to the Worcester & Nashua company, lessee, to pay for advances, etc. The lessee pays 6 per cent. dividends as part of the rental. The Worcester & Nashua company is now offering this stock to its own stockholders and has already sold a large part of it at from 90 to 95.

Portage & Mineral Point.

There is talk of building a new road from Mineral Point, Wis., northwest through Arena and Sauk Prairie to Portage, about 60 miles.

Wisconsin & Lake Superior.

This company has asked the town of Oshkosh, Wis., to vote its road \$15,000 in bonds.

Fond du Lac, Amboy & Peoria.

A contract for 75 miles of this projected narrow-gauge road has been let to Davenport & Co., of New York, who are to complete and equip it for \$12,100 per mile. Work has already been begun.

Oregon Central.

As already noted, the parties who now control this road have announced their intention of extending it some 25 miles this year. President Villard recently offered to complete the line to Amity, near the south line of Yamhill County, in time to move this year's crop, provided the farmers there would guarantee the shipment of 300,000 bushels wheat to Portland, at 12 cents per bushel. The offer has been accepted.

Richmond & Three Forks.

The Stanford (Ky.) *Interior Journal* says: "The survey of the Richmond & Three Forks Railroad has been completed, and an estimate of the cost will soon be made, and propositions will be presented to the counties of Madison, Estill and Lee, for subscription to stock. The length of the road will be 44½ miles."

Richmond, Ky., is the terminus of a branch of the Louisville & Nashville, and the proposed line extends eastward from that point.

Worcester & Nashua.

The Court has dismissed the petition of this company for an injunction against the occupying of the Boston, Barre & Gardner Company's location south of Bridge street by that company, until the Nashua road has made its connection with the Union Station at Worcester, Mass.

Lexington & St. Louis.

The Jefferson City (Mo.) *Tribune* says: "Messrs. Henry Flanagan and Chas. Schmidt, special masters in Chancery to adjust the affairs of the Pacific Railroad and Lexington & St. Louis Railroad, have filed in the office of the clerk of the United States District Court a very voluminous report. From it we find that the total amount expended by the Pacific Railroad in the construction of the Lexington Branch was \$1,052,927.69. Total amount paid by the St. Louis & Lexington Company to the Pacific, \$998,113. This leaves a difference of \$54,814.69 between the amount properly chargeable by the Pacific Railroad on account of construction and the amount paid by the Lexington & St. Louis Railroad to the Pacific on account of said construction.

"It was found, however, that on the 18th day of March, 1872, when the Lexington Branch was nearly completed, a final settlement was made by the two companies. That said settlement was reduced to writing, signed, accepted and ratified by both companies. The settlement was made after a full and careful examination of the books and vouchers of the Pacific Railroad by the committee of the St. Louis & Lexington Company, appointed for the purpose of making a settlement. The settlement was made in good faith, without fraud or concealment of facts. The settlement was intended by the parties to embrace every question connected with the construction of the Lexing-

ton & St. Louis Railroad on the part of both companies, and was to be held and considered full, final and complete. It is therefore concluded that this settlement cannot be set aside, but must be considered and held to be a full, complete and final settlement, conclusive and binding upon both parties; and hence neither party is entitled to recover from the other. "Messrs. Hamilton and Lay will file exceptions to the report, and it will come up for argument before the Court."

Philadelphia & Reading.

The Reading *Journal* of May 20 says: "Owing to the continued depression in the iron and coal trade, and consequent falling off in transportation, the Reading Railroad Company has been compelled to reduce its working force in the various shops in this city and along the line of the road. The plan adopted in reducing the force is the same as heretofore, that is to suspend gangs of men for a week or two, turn and turn about. It is not probable that the suspension will continue for more than a month or six weeks at farthest, as by that time the stock of coal at Richmond and along the line will be worked up. The efforts of the management will be to make the stoppage fall as lightly as possible on the employees of the road—the necessity for stopping at all being of course a matter of general regret."

A fast train has been put on, which makes the trip of 94 miles between Pottsville and Philadelphia in 2½ hours, an average of about 38 miles an hour. It makes but three stops. It has been put on at the request of the Reading and Pottsville people, with the understanding that it will not be continued unless it is found, after a fair trial, to pay expenses.

St. Paul & Sioux City.

The operations for April are reported as follows:

Earnings from freight.....	\$23,869 18
Passengers.....	10,251 30
Other sources.....	1,865 58
Total earnings (\$295 per mile).....	\$36,006 06
Expenses (93 per cent).....	33,420 43
Net earnings (\$21 per mile).....	\$2,585 63
Rents.....	131 00
Balance from March.....	37,038 79
Total.....	\$39,775 42
State taxes.....	\$720 12
Insurance.....	230 00
Interest on floating debt.....	4,877 01
Balance to May.....	\$34,018 29

The gross earnings show a decrease of 1.15 per cent. from those of April, 1875.

Sioux City & St. Paul.

This company reports operations for the month of April as follows:

Earnings from freight.....	\$13,671 87
Passengers.....	5,845 86
Other sources.....	2,322 17
Total earnings (\$148 per mile).....	\$21,839 90
Working expenses (99 per cent).....	21,630 61
Net earnings.....	\$209 29
Rents.....	101 00
Equipment bond sinking fund.....	1,231 34
Balance from March.....	6,420 90
Total.....	\$7,962 53

Elevator rents.....	\$268 33
Illinois Central rent.....	1,605 00
Special equipment fund.....	2,448 00
State tax.....	723 56
Insurance.....	200 00
	5,245 89
Balance, April 30.....	\$2,716 64

The gross earnings show a decrease of 2.75 per cent. as compared with April, 1875.

Oregon & California.

Mr. Henry Villard, the new President, has addressed a letter to the Portland Board of Trade, in which he says that the company's intention is to pursue the policy which may seem best adapted to build up its local interests. He also says that it will extend the Oregon Central road, which it controls, to Junction City and will endeavor to build 25 miles of such extension this year. He believes that a connection with the Central Pacific is not required for the true interests of the State.

Georgia.

The Treasurer's office of this company is better off than most offices of that kind, for, at the recent annual meeting, the committee appointed to examine the company's assets reported that there was an excess in cash of \$1,750.26 over what the books called for. The committee stated that, as the whole amount called for by the books of the company chiefly consisted of its bank bills redeemed, the excess may in part be accounted for by reason of the fact that considerable sums in half fragmentary, badly mutilated and charred remains of notes which the committee assume, may have been redeemed according to the proportion of the note recognizable.

It was resolved that the President and directors be authorized to burn any bonds, coupons, bank-notes or other securities redeemed. The reference to bank-notes is explained by the fact that the company's charter gives it power to conduct a bank as well as to operate a railroad.

Seattle & Walla Walla.

Work has been begun on the piling and trestles at Seattle, where about two miles of such work are required. Arrangements are being made for iron and locomotives. It is probable that shops will be put up and the cars built at Seattle, where lumber is very cheap, as the expense will be less than to bring the cars from California or the East.

Santa Cruz.

This road is now completed to Pajaro depot on the Southern Pacific, three miles beyond the late terminus at Watsonville, Cal. The road is now 23 miles long, from Santa Cruz southeast to Pajaro. Trains have begun to run through in connection with the Southern Pacific.

Nevada County.

This road is now completed to Nevada City, Cal., 8½ miles beyond the late terminus near Grass Valley and 29½ miles from the junction with the Central Pacific at Colfax. The completion of the road was celebrated by appropriate ceremonies at Nevada City. The road, which is of 3-foot gauge, passes through a fine mining and timber country with a considerable population.

Rockford, Rock Island & St. Louis.

The following circular bears date May 20, 1876, and is signed by H. Osterberg, Agent and Trustee:

"I hereby give notice that I have sold the Rockford, Rock Island & St. Louis Railroad, and the Orion & Minersville Railroad, with their appurtenances, to the St. Louis, Rock Island & Chicago Railroad Company, who will assume the business and control of all matters pertaining to said roads from the time the same came into my possession."

The new company issues the following circular, signed by H. Osterberg, President, and Walter Trumbull, Secretary:

"Having purchased the Rockford, Rock Island & St. Louis,

and the Orion & Minersville railroads, and possession of said roads having been surrendered to this company by Mr. H. Osterberg, Trustee, and having assumed the business and control of all matters pertaining to the said roads, notice is hereby given that Mr. Geo. Skinner has been elected General Manager of this company, and that the heads of departments will continue to serve in their present positions until further notice. Agents and others will remit to the People's National Bank, Rock Island, Ill., for account of the St. Louis, Rock Island & Chicago Railroad Company, all moneys on account of business originating on and after the time when Mr. H. Osterberg, Agent, took possession of the road.

Intercolonial.

The privilege of conducting the express business over this road has been let to the Eastern Express Company, which was the highest bidder. That company now does business over the lines of the Eastern, the Maine Central and the European & North American roads.

Mr. Brydges has recently been in conference with the city authorities of St. John, N. B., and it is understood that the question of a bridge connection with the European & North American at St. John was under consideration. It is stated that the bridge has been decided on, but the location is still in doubt.

Joplin & Girard.

The grading of this road is substantially completed, and track-laying was begun last week. It is expected that the road will be completed and in operation by October. It is 37 miles long, from Joplin, Mo., westward to Girard, Kan., on the Missouri River, Fort Scott & Gulf road, and is intended to give the Joplin lead mines an outlet and also a connection with the coal fields of southeastern Kansas. The road is being built entirely from the stock subscriptions by parties interested in the Joplin mines.

Olympia.

The Thurston County (Wash. T.) Commissioners have resolved to extend for one year from July 31 the time for completion of this road, in order to secure the county subsidy of \$90,000. The road is to run from Olympia to Tenino, 15 miles, but no one seems to be anxious to build it for the subsidy.

Bellaire & Southwestern.

Three lines have been surveyed between Woodsfield, O., and Beallville, and negotiations begun for the right of way, although the final location has not been decided on.

Sancock Valley.

At the annual meeting, May 25, resolutions were adopted instructing the directors to require the enforcement of the contract with the Concord Company, lessee, with reference to the running of trains.

Davenport & St. Paul.

The bondholders, for whose account this road was bought at the recent foreclosure sale, have agreed to raise the \$200,000 required to complete the road into the city of Davenport, Ia., provided the city will give the right of way. The distance is about four miles and the right of way will cost about \$50,000.

Logansport, Crawfordville & Southwestern.

Notice is given that all claims and accounts against this road or the Receiver must be presented to John D. Hayward, Master, at his office in the United States Court House, Indianapolis, June 24, to be submitted and heard in pursuance of the order of the United States Circuit Court.

Chicago, Milwaukee & St. Paul.

The State Treasurer of Minnesota has brought suit to recover the amount claimed to be due from this company as tax on gross earnings of the road in Minnesota. The case is to be heard at a special term of the court to be held June 17.

Proceedings have been begun in the New York Supreme Court to substitute the Farmers' Loan & Trust Company for David M. Hughes as trustee under the sinking-fund mortgage. The ground upon which the petition is based is that Mr. Hughes is no longer a resident of the United States, having lived in France for several years.

Waynesburg & Washington.

The original contractors, John and Charles Donohue, having failed to carry out the terms of the contract, the company has taken possession and work has been re-umed and will be pushed forward, under charge of Messrs. Edburn & Cooper, engineers and contractors. The ties are ready for delivery and negotiations are in progress for iron and equipment.

Camden, Gloucester & Mt. Ephraim.

The track is now laid to Mt. Ephraim, N. J., 3 1/2 miles southwest from the late terminus at Gloucester, making the road 6 1/2 miles long from Camden. The road is now complete, but it is to be extended from Mt. Ephraim to Blackwoodtown by another company organized for that purpose.

Eastern Counties.

It is reported that Sir Hugh Allan has made an offer to build this proposed Nova Scotia road. He is known chiefly as a great steamship owner, and from his connection with the Canadian Pacific, and he has also a considerable interest in Nova Scotia coal property. The latter may make it desirable to him to secure control of the new road.

Tyler Tap.

It is stated that President Douglas has contracted for iron enough to lay 50 miles of the track at an extremely low price. This 50 miles would carry the road from Tyler, Tex., to a point near Pittsburgh, in Camp County.

Dubuque & Cascade.

It is proposed to build a narrow gauge road from Dubuque, Ia., southwest to Cascade, about 30 miles. This would be near the route proposed for the new line of the Dubuque Southwestern.

Hudson Tunnel Railroad.

The Chancellor of New Jersey has modified the injunctions against this company so far as to permit it to go on and apply for a commission to condemn the lands which it needs and which are owned by the Delaware, Lackawanna & Western Company. He has, however, continued the injunction to restrain the company from continuing work without first obtaining the consent of the State Riparian Commission for the use of the lands under water which are needed for the construction of the tunnel.

Texas & Pacific.

The contract for grading all that part of the 30 miles from Eagle Ford, Tex., westward to Fort Worth, which has not already been graded, has been let to Rosch Brothers, who begin work at once. Contracts have also been let for ties and bridging for 83 miles on the Trans-continental Division, between Paris and Texarkana.

Connecticut Valley.

The Springfield Republican says: "Rumors are in the air in Connecticut to the effect that the creditors of the Connecticut Valley Railroad are moving for a settlement of their claims, and that the bondholders are inclined to foreclose on the road rather than accept any compromise. It is also said that the road is getting tired of its leases of the connection between Hartford and this city, and will try to get free from them or so-

sure some modifications. Another authority says that whereas in April, 1875, its expenses were 90 per cent. of its receipts, in April, 1876, they have been cut down to 60 per cent. The road is managed mainly by Vice-President Babcock and Mr. E. R. Wiggins, the new President of the Charter Oak Life, which is the power behind the throne."

The company's Springfield connection consists of 30 miles of road, the annual rental of which is about \$45,000, or \$1,500 per mile. The line should have considerable local business, but what through traffic it gets is in competition with an old established line, and is probably taken at moderate rates. The new line has been worked but a few months, hardly long enough to establish its business or fairly test its value.

The debt of the company by its last annual report, Sept. 30, 1875, consisted of \$1,000,000 first and \$1,225,000 second-mortgage bonds and \$213,821 floating debt. Interest, we believe, has always been paid upon the first-mortgage bonds; the second-mortgage bonds are hypothecated with the Charter Oak Life Insurance Company as security for debt due that company, and no interest has ever been paid upon them.

International & Great Northern.

The grading of the extension from Rockdale, Tex., to Austin is finished to Brushy Creek, 12 miles, and track-laying has been begun. The Brushy Creek bridge is being put up.

Galveston, Brazos & Colorado.

This company is making arrangements to begin work west of Galveston. An effort is to be made to secure the road-bed which was graded through parts of Brazoria and Wharton counties for the old Houston Tap & Brazoria road, which was paid for by county subscriptions. This section was never ironed, and it is claimed that it was not included in the sale of the International & Great Northern.

Newfoundland.

Mr. Sandford Fleming has completed a survey of this proposed road, and has made a report thereon to the Government of the island. The length of the road is to be about 360 miles, and the estimated cost is \$33,000 per mile. Mr. Nicholas Stubbs is forming a company in London to build the road and has applied to the local Government for a concession.

The Boston & Philadelphia Through Line.

As has been already noted, the cars of the new through line between Boston and Philadelphia are carried between Mott Haven and Jersey City by the transfer steamerboat Maryland. This boat is owned and run by a company organized for the purpose in Connecticut, and known as the New England Transfer Company. The corporation of the city of New York claims and has always heretofore exercised the right to control all ferries to or from points within the city limits. In order to test the question application was recently made in behalf of the city to enjoin the company from running its boat. The suit was brought in the New York Supreme Court, but, on May 27, an order was granted transferring it to the United States Circuit Court.

ANNUAL REPORTS.

Boston, Clinton & Fitchburg.

This company works the following lines:

	Miles.
Main line from Fitchburg, Mass., to Mansfield, with branch from Pratt's to Sterling Junction.....	62.55
Marlboro Branch.....	1.47
Total owned.....	64.12
Framingham & Lowell R. R., leased.....	26.12
New Bedford R. R., leased, New Bedford to Mansfield.....	32.56
" Fairhaven Branch.....	15.17
" Attleboro Branch.....	8.60
" Acushnet and Weir branches.....	0.96
Total.....	147.53

The main line from South Framingham to Mansfield, formerly leased from the Mansfield & Framingham Company, has become part of the line owned by consolidation during the year. The whole road worked forms a line from Fitchburg to New Bedford, with branches to Lowell, to Attleboro and to Wareham, with the shorter spurs.

The equipment consists of 41 engines; 53 passenger, 29 baggage, mail and express cars and 884 freight cars.

The credit side of the capital account at the close of the last fiscal year, Sept. 30, 1875, was as follows:

Guaranteed stock.....	\$22,100 00
Preferred stock.....	1,040,900 00
Common stock.....	109,600 00
Total stock (\$16,288 per mile).....	\$1,172,600 00
Funded debt (\$93,377 per mile).....	2,069,600 00
Bills payable.....	46,000 00
Balances due and unclaimed dividends.....	347,171 06
New Bedford equipment account.....	474,504 10
Framingham & Lowell equipment account.....	182,062 00
Surplus.....	296,280 23
Total.....	\$4,588,197 39

The funded debt consists of \$1,199,600 mortgage bonds and \$870,000 equipment notes; the annual interest charge on it is \$149,572. The company owns \$125,000 of its stock. The Framingham & Lowell equipment is due April 1, 1892; the New Bedford equipment account April 1, 1923; neither bears interest.

The work done for the year was as follows:

Total train mileage.....	803,088
Passengers carried.....	908,160
Passenger mileage.....	16,908,600
Tons freight carried.....	759,412
Tonnage mileage.....	21,128,062

The earnings for the year were as follows:

	1874-75.	1873-74.	Inc. or Dec.	P. c.
Freight.....	\$597,742 23	\$574,712 76	Inc....	\$23,029 47 0.4
Passengers.....	466,448 17	478,341 07	Dec....	11,792 90 2.5
Mails and Express.....	39,964 60	29,504 80	Inc....	4,459 71 15.1
Miscellaneous.....	31,362 49	15,643 91	Inc....	7,518 58 57.7
Total.....	\$1,119,517 49	\$1,093,002 63	Inc....	\$23,514 86 2.1
Expenses.....	718,314 75	727,375 62	Dec....	9,060 77 1.3
Net earnings.....	\$401,202 74	\$365,627 11	Inc....	\$32,575 63 8.8

Gross earnings per mile.....	\$7,690	\$7,773	Dec....	\$183 2.4
Net earnings per mile.....	2,790	2,614	Inc....	106 4.1
Per cent. of exps.....	64.16	66.37	Dec....	2.21 3.3

The disposition of net earnings was as follows:

Net earnings.....	\$401,202 74
Dividends on preferred and guaranteed stock.....	\$46,689 00
Interest.....	114,663 57
Rent of Mansfield & Framingham R. R., eight months, up to consolidation.....	27,899 06
Framingham & Lowell interest.....	32,540 60
New Bedford R. R. rent and dividends.....	174,306 44
Total.....	\$365,627 68

Surplus for the year.....

Carried to surplus account from proceeds of preferred stock under terms of consolidation.....	\$5,175 06
Surplus from previous year.....	118,503 57
Surplus at close of year.....	172,681 60
Surplus at close of year.....	\$296,280 23

The report says: "In accordance with special act of the Legislature, and by vote of the stockholders of this corporation, and the stockholders of the Mansfield & Framingham, the last-named corporation was consolidated with and became a part of the Boston, Clinton & Fitchburg Railroad Corporation from and after June 1, 1875.

"By this consolidation your corporation embraces 64 miles of railroad, extending from Fitchburg to Mansfield, with a branch from Pratt's Junction to Sterling Junction, and So. Marlboro to Marlboro.

"We believe this union adds strength and increased value to the whole property, and it seems to meet the approval of all parties interested, and nearly all the stockholders of the Mansfield & Framingham Railroad have availed themselves of the terms of consolidation.

"While the general depression of business has greatly affected the various railroad interests throughout the country, your road seems to be located in a section of the State particularly favored with local improvements and enterprises which contribute largely to the interests of the business of your line of railroad, not only for the present but in the future.

"Our business seems to have made a good start for the new year. At the time of making this report the months of October and November show a gain over the corresponding months of last year of \$7,186.24 and we feel confident December will show a gain also.

"The rolling stock and road-bed have been very much improved and several hundred tons steel rails have been laid during the year."

Missouri, Kansas & Texas.

This company owns a line from Hannibal, Mo., southwest through Sedalia to Fort Scott, Kan., and thence southward across the Indian Territory to Denison, Tex., 575.5 miles; a branch of this line from Parsons, Kan., north by west through the Neosho Valley to Junction City, 156.5 miles, and a detached line 54 miles long, extending from Holden, Mo., on the Missouri Pacific westward to Paola, Kan. The road has been for some time past in the possession of Mr. Wm. Bond, as Receiver, and the present report, which covers the year ending Dec. 31, 1875, is made by him to the United States Circuit Court for Texas, Kansas and Missouri. The whole mileage of main track is 796 miles; of sidings, 48 miles.

The work done for the year was as follows:

Freight train mileage.....	1,011,714
Passenger train mileage.....	175,585
Maintenance of way and switching mileage.....	319,939

Total mileage.....	2,066,178
Passengers carried.....	175,585
Passenger mileage.....	17,820,959
Tons freight moved.....	390,341
Tonnage mileage.....	82,877,034

Of the tons moved 329,896 tons were revenue-paying freight and 60,445 materials, etc., for the company. Of the revenue tonnage 24.7 per cent. was live stock, 14.5 per cent. grain and 11.3 per cent. coal. There were carried 37,413 bales cotton. The average distance traveled by way passengers was 84.79 miles; by through passengers, 390.53 miles.

Some general averages for the year are here given:

Average revenue train mileage per mile of road.....	2,239
" passenger.....	32,673
" tonnage.....	105,445
" receipt per passenger per mile, through.....	4.360 cts.
" " " " " way.....	3.560 "
" " " " " all passengers.....	4.210 "
" " per ton per mile.....	2.359 "

Rates on through business are kept down by competition for that class of traffic. The earnings for the year were as follows:

Freight (67.30 per cent. of total earnings).....	\$1,955,115 18
Passengers (25.85 per cent.).....	790,977 41
Mails (4.56 per cent.).....	132,351 33
Express (2.15 per cent.).....	62,447 35
Miscellaneous (0.14 per cent.).....	4,134 01
Total earnings (\$3,697 per mile).....	\$2,904,925 28

The expenses were:

Conducting transportation (27.13 per cent.) of total earnings.....	424,180 73
Motive power (25.56 per cent.).....	399,667 60
Maintenance of cars (9.38 per cent.).....	146,725 40
Maintenance of way (19.46 per cent.).....	304,219 62
General expenses (5.14 per cent.).....	80,422 65
Renewals (12.14 per cent.).....	189,735 27
Improvements (1.19 per cent.).....	18,592 79

Total expenses (53.82 per cent.).....

Net earnings (\$1,707 per mile).....	\$1,341,821 12
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The earnings include only such earnings as produce a money result. The Receiver keeps no construction account and all renewals and improvements are charged to working expenses. The principal items of renewals were \$101,576.15 for new ties and \$69,459.37 for new rails. The taxes paid were \$116,960.47; adding these to the working expenses increases the proportion of expenses to earnings to 57.85 per cent. The last report published by the company was for the year ending March 31, 1874. Comparing the present report with the published monthly earnings for 1874, we find in 1875 a decrease in gross earnings of \$245,800, or 7.8 per cent.

The Receiver's general account for the year is summed up as follows:

Gross earnings of road.....	\$2,904,925 28
Cash from Land Department, sales.....	64,664 42
From Missouri, Kansas & Texas Co.'s account.....	332,588 13
Receiver's liabilities.....	187,092 39

Total.....

Operating expenses.....	\$1,563,404 16
Taxes on lands.....	116,960 47
Hannibal & Central Missouri and Tebo & Neosho coupons.....	76,126 80
Sundry expense accounts.....	32,906 97
Paid for 127 bonds Union Pacific, Southern Branch, from Land Department receipts.....	62,881 07
Land Department expenses.....	15,160 98
Governments certificates charged out of earnings.....	2,864 01
Paid on account of M., K. & T. Co.....	727,273 61
Balance, Receiver's assets.....	\$272,914 00

Of these assets \$439,489.43 are cash; \$90,639.78 supplies on hand, and the rest balances due from the United States, from other companies, and for uncollected freight bills.

The Receiver has paid for taxes due previous to his appointment \$276,151.78, under orders of the court, and \$586,570.36 for other debts of the company.

The road and equipment have improved in condition. The Receiver recommends the purchase of 200 box cars (since ordered); the expenditure of \$10,000 in enlarging the Sedalia shops; of \$10,000 in improving the water supply at several points; of \$30,000 for improving trestles on the Hannibal Division, and \$10,000 for fencing. About 250,000 new ties and from 3,500 to 5,000 tons of re-rolled iron will be needed for repairs during the current year.

Pensacola & Perdido.

This company owns a road 9 miles long from Pensacola Bay to Perdido Bay, in Florida, which is used mainly to transport lumber. The company has a wharf on Pensacola Bay 2,360

